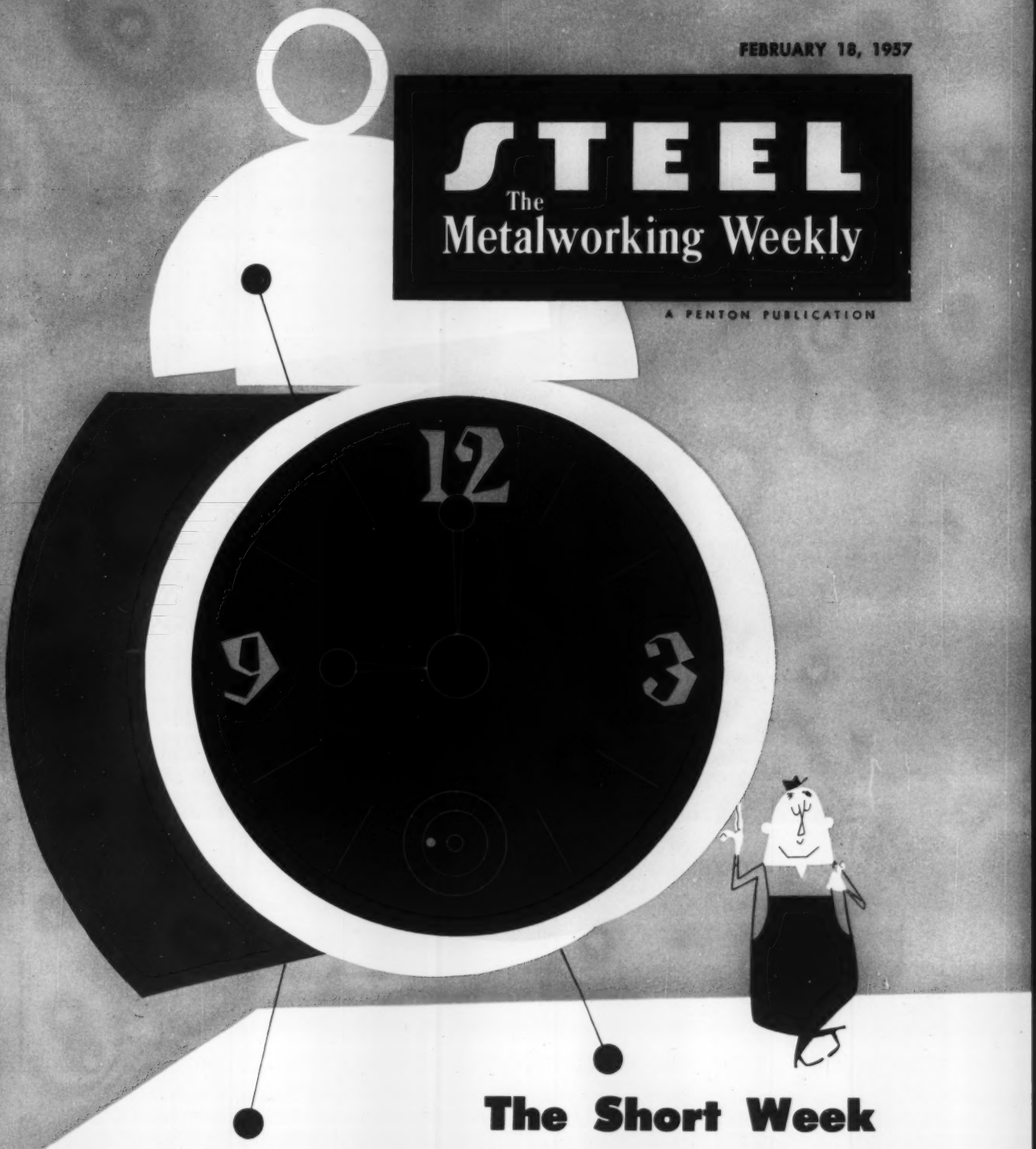
FEBRUARY 18, 1957

STEEL
The Metalworking Weekly

A PENTON PUBLICATION



The Short Week

Sharp rise in productivity needed to make it economically possible . . . page 107

✔ **Ideas for Waste Treatment . . . page 150**

✔ **Pressure Builds for Boiler Tubing . . . page 229**

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Bucket crane of the Level-Luffing type operates speedily under EC&M Contra-Torque Hoist Control

Bucket cranes in this fertilizer plant operate at high output with EC&M Contra-Torque Hoist Control

HERE'S HOW EC&M FREQUENCY RELAY CONTROL improves A-C Bucket Crane performance

CONTRA-TORQUE®

FAST GETAWAY! Quickly responsive to the frequency of the induced-rotor voltage, **EC&M FREQUENCY RELAYS** match torque requirements to the load. They get the motor up to speed quickly for lowering the bucket and moving the trolley in or out. A lot of time saved between trips!

WIDE SPEED SELECTION! These relays permit pick-up of Contra-Torque lowering connections on any master switch speed point. No waiting until last down point is reached. Wider choice of speed gives greater flexibility in clean-up operations and speeds output!

SMOOTH STOPPING! When checking motor-lowering speed, weak torques are provided for light loads or the empty bucket; stronger torques for heavier loads. Trolley motor is stopped and reversed smoothly under frequency relay automatic operation!

SPEED-LIMITING! Safety on all speeds. These relays (one set for hoisting and lowering) automatically shift motor connections to safeguard lowering operation with far greater skill than human hands.

THE ELECTRIC CONTROLLER & MFG. CO.

A DIVISION OF THE SQUARE D COMPANY

CLEVELAND 28 • OHIO

7407

Steel cylinder weighs 83 tons, has walls 10 ¼ in. thick

This burly giant of molybdenum-vanadium steel is the main cylinder of a 7500-ton plate-stretcher. Forged and machined in the Bethlehem shops, it was successfully tested for 50,000-psi minimum yield point.

The big cylinder weighs better than 83 tons; is 17 ft 3 in. long, has an ID of 70 in., and a maximum OD of 105 in. at the collar. To withstand the tremendous pressures that will be generated in service, a wall thickness of 10¼ in. was provided.

The forging well illustrates Bethlehem's capacity for heavy work of this nature. Bethlehem shops are fully able to produce the largest, heaviest pieces ever required. But let us emphasize that we're equally well set up for the smaller items, including all types of drop, upsetter, and specialty forgings.

Whenever we can be of service to you, please call or write. You will find our engineers particularly helpful and cooperative. They'll work with you all the way on any forging problems you may have.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Always, at SKF, you will receive unbiased advice

because

– All four basic types of anti-friction bearings are available from **SKF**.

because

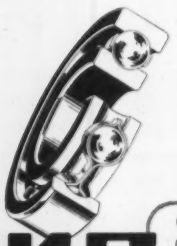
– They offer an extraordinarily wide range of sizes and combinations to meet virtually any requirement.

because

– Their long experience in the widest variety of bearing applications is your assurance of receiving sound recommendations.

because

– Thousands of manufacturers have been using the **SKF** Bearing Advisory Service for many years – always with good results. This dependable service is available to you, too. 7754



SKF

EVERY TYPE—EVERY USE

Ball Bearings
Cylindrical Roller Bearings
Spherical Roller Bearings
Tapered Roller Bearings ("Tyson")

* Reg. U.S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

SOMOROFF-N.Y.

IN FLATWARE, TOO, **STANDS OUT**

A thorough knowledge of flatware manufacture — uncompromising adherence to analysis specifications — plus, the industry's finest finishes are reasons why so many of the nation's leading stainlessware makers demand Sharon Quality Stainless Steels.

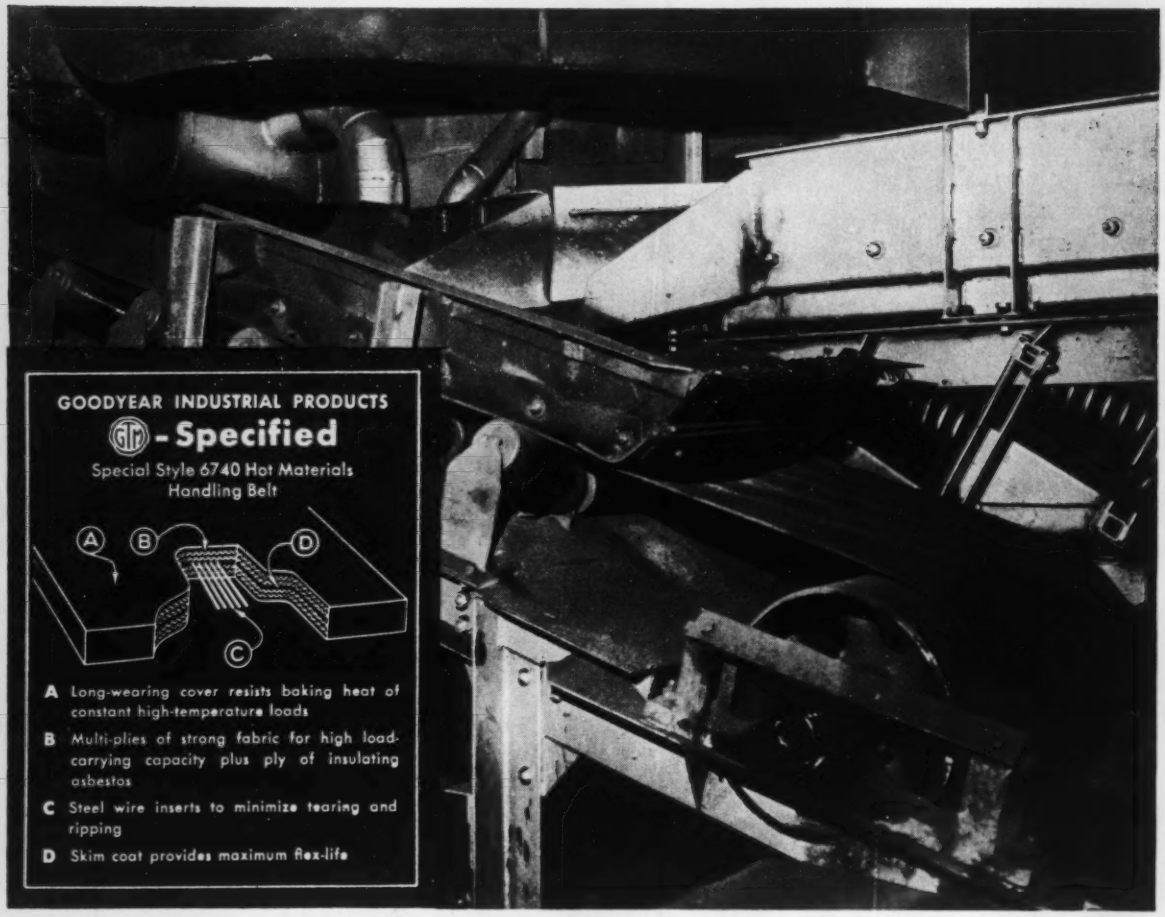
SHARONSTEEL

For 56 Years a Quality Name in Steel

SHARON STEEL CORPORATION, SHARON, PENNA.

165

CHICAGO, CINCINNATI, CLEVELAND, DAYTON, DETROIT, GRAND RAPIDS, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, NEW YORK, PHILADELPHIA, ROCHESTER, SAN FRANCISCO, SHARON, MONTREAL, TORONTO


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
Special Style 6740 Hot Materials Handling Belt
A
B
C
D
A Long-wearing cover resists baking heat of constant high-temperature loads
B Multi-plies of strong fabric for high load-carrying capacity plus ply of insulating asbestos
C Steel wire inserts to minimize tearing and ripping
D Skim coat provides maximum flex-life

G.T.M. Saves $4000/year on shake-out refuse belts

SHARP, hot shot, gates, risers and other scrap quickly tore and burned up refuse-handling belts at this automotive foundry. On the average, the 126′ belts only lasted two months. Usually large patches had to be put in the belt to get even two months' service.

Special, wire-inserted belts (see blueprint) and vulcanized, rather than steel-plate, splices were suggested by the G.T.M.—Goodyear Technical Man. Result: *Service averages six months with $4000 annual savings.*

Your belt or other industrial rubber problems may be similarly solved by the G.T.M. and your Goodyear Distributor. Call them, today! Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

STYLE 6740 CONVEYOR BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

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The Metalworking Weekly

February 18, 1957
Vol. 140 No. 7

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XLO
PRECISION BORING MACHINES
High production, cost-saving machines for fast, accurate boring, turning, facing, chamfering and grooving.

Standard Precision Boring Machines

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Vertical Precision Boring Machines
EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

behind the scenes

Put to the Question

At regular intervals, Daniel Starch and his staff, consultants in business research, select an issue of STEEL and hold it up before a cross section of the readership. "What," inquires Dan and his boys of their prey, "do you honestly think of this magazine?"

They go through the magazine together, page by page. The interviewer asks the reader what he remembered about each article and advertisement, and the reader gives it to him straight. One man said that he glanced at this page because it carried an item about an old sailor named George, and since he, too, was an old sailor named George, it stirred his interest. Beyond that, he didn't care much about the magazine because it was too technical.

Favorable opinion, however, is practically unanimous. Oral respondents, taken at random from a thick list of typical STEEL readers, are kindly disposed toward STEEL because it is helpful to them in their business. The deep and continuing interest shown in the outlook pages, editorials, prices and other features is a source of pleasure and satisfaction to the editors—because even editors are human enough to delight in praise for a job well done.

The issue you are now holding will be Starched. You, of course, will have one chance in about 1600 of being interviewed, but don't let that bother you. If you are a member in good standing of the sparsely peopled "Behind the Scenes" club, you may send in your own comments on this issue, and we'll compare them with the Starch findings.

Your Views Invited, Too

Some of the early comments were delightful. One man said he dealt in brass, so he didn't care for STEEL. Another complained that STEEL was a sort of a newcomer to the metalworking field (this publication is only 75 years old) and, therefore, lacked maturity. If it were up to him, said another, he would never take STEEL because it caters to big people, and he was just a little guy.

Many suggestions are sound and provocative; recommendations have been made, for instance, to put the table of contents on page 1, or to insert short synopses at the beginning of each article.

Some of the questions asked by the Starch boys are: "Does STEEL help you in your work? If yes, how?"; "May we have your comments on its news, markets, prices, engineering, departments, features?"; "Please tell us something, favorable or unfavorable, about STEEL."

Maybe a little unofficial prying on our part might bring to light views and comments that might never have been revealed had we not given everybody an opportunity to get in on our private Starch act. Aim both barrels at Shrdlu, Penton Bldg., Cleveland 13, Ohio.

Shrinking Hours

The wonderful world of tomorrow is closing in fast—that combination Valhalla, Canaan, nesting area for bluebirds and Land of Jubilo. Not, we hasten to add, the land where the wicked cease from troubling and the weary are at rest, but this real, genuine old world where the short work week will prevail. The story on this wonderful deal (page 107) answers many questions that even now are troubling the hearts of metalworking executives all over the country. You see, one of the major demands of the UAW in 1958 is a 30-hour week, but some of the smaller unions already are clamoring for it. So far, neither union nor management has settled on the apportionment of the time. Shall we work 7½-hours a day for four days, or 6 hours for five days? What will this new time program do to production? What are the boys going to do with all that leisure time? How are you going to work your schedules? Better check STEEL's findings in this matter.

Puzzle Takes Poor Tern

If a sloppy old sea gull living on the Cleveland breakwater flew 120 daylight miles during a three-day weekend at the end of the third week in September, approximately how many days would he be on the wing beginning Jan. 15 to cover 360 miles?

Shrdlu

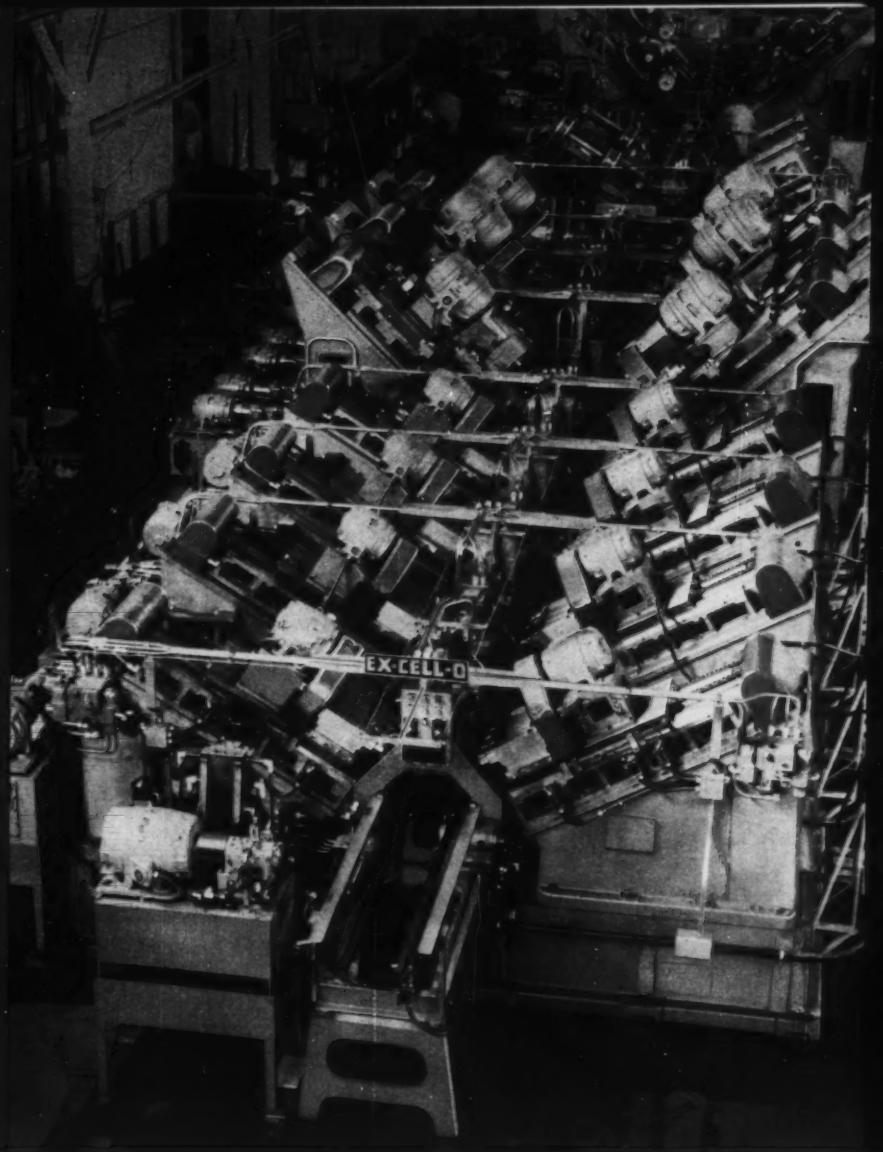
(Metalworking Outlook—Page 101)

XLO

EX-CELL-O FOR PRECISION

3000 Engine Blocks Per Day -

How one company competes in the world's toughest market . . .



The photograph above is a view in the auto plant shortly after the automation line was installed. At right above, a portion of the line as it neared completion in the Ex-Cell-O plant.

These Ex-Cell-O automation machines play an important part in turning out engine blocks for one of the "big three" of the automotive industry. This manufacturer's engine must compete in one of the toughest markets in the world.

Ex-Cell-O's part in the manufacturing process is 1200 feet of production line using the newest machines in assembled integrated units. Among the precision machining operations performed are boring, broaching, chamfering, milling, reaming and grooving.

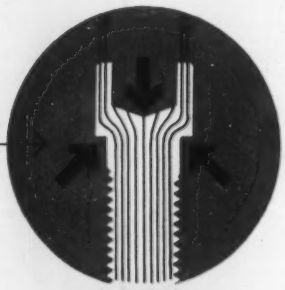
Ex-Cell-O—builders of standard and special machine tools for 25 years—uses standard bases and subassemblies wherever possible. This means that product changes do not necessarily obsolete equipment. You save, too, in initial cost.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

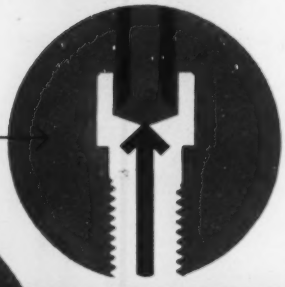
56-43

HOLO-KROME SOCKETS COMPLETELY FORGED!



Metal fibers stay intact for greatest strength. No drilling, cutting, broaching to weaken socket walls.

NO WALL TAPER IN HOLO-KROME SOCKETS!



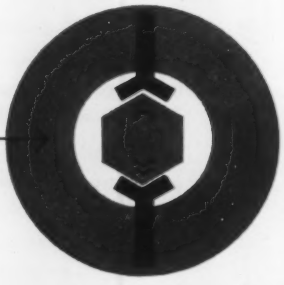
Hex key bears evenly against smooth untapered walls. The results: easier, faster assembly . . . longer key life . . . fewer damaged screws!

The secret's in the socket of H-K cap and set screws

H-K CONTROLS SOCKET DEPTH FOR TOUGHER SCREWS!

Sockets are formed deep enough for hex key to get a firm, solid bite . . . yet scientifically proportioned to give maximum strength to the screw head.

H-K's SHARP SOCKET CORNERS RESIST REAMING!



The hex key fits better, bears evenly under pressure, gets a solid grip for positive fastening.

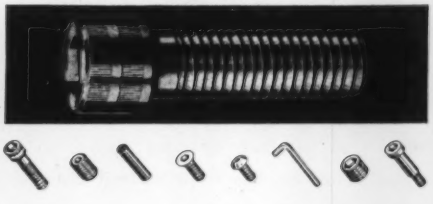
IT TAKES 26 YEARS OF SKILL, EXPERIENCE AND KNOW-HOW TO TURN OUT A HOLO-KROME SOCKET SCREW!

HK

FOR THE FINEST IN SOCKET SCREWS . . . FOR UNMATCHED SAME-DAY SERVICE . . . THE NAME TO REMEMBER IS

HOLO-KROME

THE HOLO-KROME SCREW CORP., HARTFORD 10, CONN.



This Scott Wiper is being used with a solvent to clean inside the necks of TV tubes at Tung-Sol Electric, Inc. Scott Wipers are 2-ply paper sheets, with plies welded for extra strength. Their specially processed surface, lint-free, makes Scott Wipers ideal for such work.

WIPER PROBLEM? Look what Tung-Sol did with Scott Wipers!

Tung-Sol Electric, Inc., Newark, N.J., got tired of collecting, sorting, storing and laundering rags. They switched to Scott Wipers—got improved wiping, and cut overall wiping costs.

Tung-Sol uses soft, absorbent Scott Wipers throughout its operation. Ideal for industrial wiping jobs, Scott Wipers are chemically treated for excellent wet strength—can even be used with solvents. Lint-free, they're used regularly at Tung-Sol for cleaning out the necks of TV tubes. In the machine shop, Scott Wipers also do a better job on stock, tools and machines.

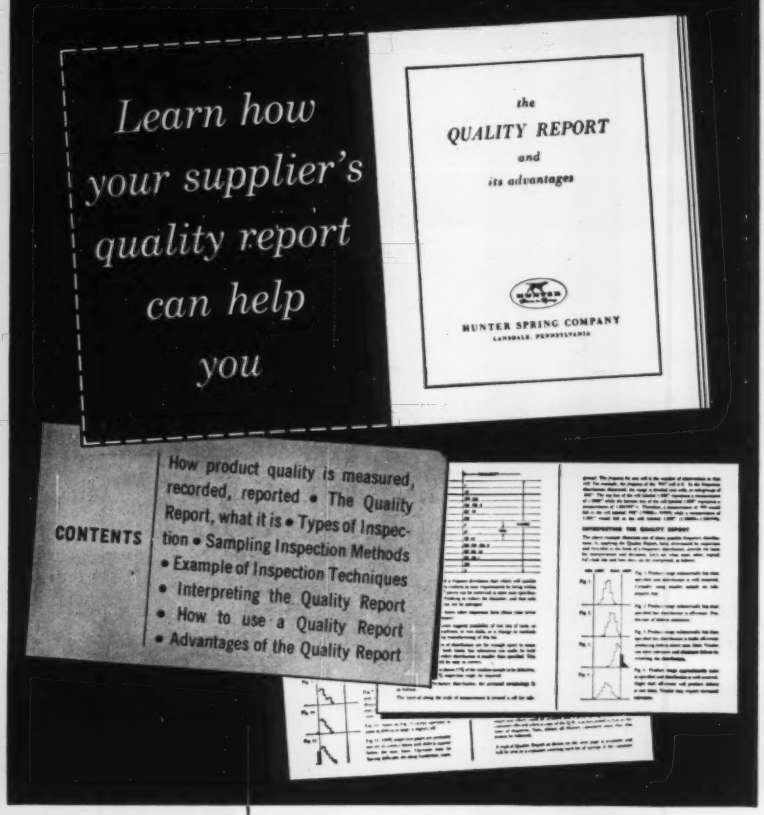
Scott Wipers are easily disposed of—and when they're fresh out of their "pop-up" box, they have no clinging metallic particles to scratch or cut. Employees appreciate their cleanliness and softness for wiping hands and faces. Want more details? Call your local Scott representative or distributor. Or write Scott Paper Company, Dept. S-72, Chester, Pa.

SCOTT PAPER COMPANY

Makers of the famous Scott paper products you use in your home.
Consult your local TV schedules for Scott's program, "Father Knows Best."

PURCHASING AGENTS!

Learn how your supplier's quality report can help you


the
QUALITY REPORT
and
its advantages
HUNTER SPRING COMPANY
LANSDALE, PENNSYLVANIA
CONTENTS
How product quality is measured, recorded, reported • The Quality Report, what it is • Types of Inspection • Sampling Inspection Methods
• Example of Inspection Techniques
• Interpreting the Quality Report
• How to use a Quality Report
• Advantages of the Quality Report

"It's great. An excellent presentation of the subject."
. . . J. R. Keough
FENWAL, INC.

"I should like to commend the authors of this booklet for having done a very fine job of presenting the subject matter in a non-technical way, and at the same time bringing out forcibly the advantages . . ."
. . . Paul A. Robert
THE GRUEN WATCH COMPANY

". . . one of the simplest yet most lucid descriptions of attribute and variable inspection that I have read."
. . . W. W. Gallagher, Jr.
MACGREGOR INSTRUMENT CO.

". . . very nicely done and highly informative."
. . . Edward J. Greenholt
THE BUDD COMPANY

". . . would be opportune to stimulate thought and we could use any quantity you feel could be spared . . ."
. . . H. W. Robb
GENERAL ELECTRIC CO.

Written verification of quality—that's what buyers are demanding *and getting* from their suppliers of specified components. "The Quality Report and Its Advantages"—a booklet telling how to use the supplier's Q. R.—was published by Hunter to help you avoid "Quality" headaches. It can be a real help because—

. . . it explains the "Quality Report"—the supplier's *written record* of actual test results made during product inspection.

. . . it explains how the PA can use the Q. R. to check on supplier's conformance to established specifications.

. . . it is written in non-technical, quick-reading style so busy PA's can learn more about the growing use of Quality Control techniques, test methods, and the advantages of "Quality Reporting."

This booklet will be sent free immediately on request.

Every shipment of parts supplied by Hunter automatically includes a "Q. R." on tested characteristics.

HUNTER

HUNTER SPRING COMPANY

19 Spring Avenue, Lansdale, Pennsylvania
(near Philadelphia)

SPRINGS • STAMPINGS • TEST APPARATUS

(pioneers in Quality Reporting)

LETTERS
TO THE EDITORS

Intelligent Use of Research

Your 1957 Metalworking Yearbook and Planning Guide (Jan. 7) was an excellent job. I have lifted liberally from it in formulating our own sales plans and have used the statistics to substantiate our comments.

Market research has become a big thing, and you seem to make a most intelligent use of it.

Thank you for including me in your Forum on Technical Progress. It is certainly flattering. I have had comments from various sources.

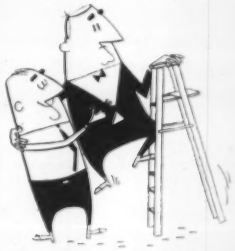
D. J. Champion
Vice President-Sales Manager
Champion Rivet Co.
Cleveland

Roundup on Magnesium

Our magnesium department thinks you did a commendable job on the article, "More Work for Magnesium" (Jan. 28, page 105). I've been deluged with requests for reprints. Can you let us have 12?

William M. Cox
Public Relations Department
Dow Chemical Co.
Midland, Mich.

In-Plant Help Up the Ladder



Please send us five copies of the article, "Primer for In-Plant Training" (Jan. 28, page 68). May we reproduce this article for distribution among our management personnel?

Bob Sumpter
Salaried Personnel Representative
Reynolds Metals Co.
Corpus Christi, Tex.

• *Permission granted.*

Left Out of Who's Who

The Jan. 14 issue contained an article, "Who's Who in Atomics" (page 42), that carried information attributed to the Atomic Industrial Forum. We were more than a little disappointed at the lack of mention of Alco Products Inc. in this roundup.

For example, you list work carried forward on the construction of 17 reactors in the box, "Commercial Atomics Hits Stride in '56." This listed seven power-type reactors for the Navy, four for private U.S. buyers and three for the federal government.

We assume that the Army Package Power Reactor at Ft. Belvoir would fall in the last category and were disappointed that Alco was not included among companies listed as having continued its work during last year in the

(Please turn to page 12)

Users tell you . . .

How Norton wheels cut O.D. grinding costs and improve quality

Here's the "Touch of Gold" to give your cylindrical and centerless grinding great advantages

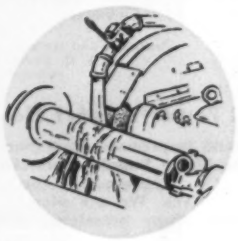
Cooler cutting action . . . faster stock removal . . . better finish . . . more pieces per wheel and dressing . . . easier dressing, with less wear on diamond or crushing roll.

Those are typical benefits reported by Norton G Bond and BE Bond wheel users all over the country — concerning every type of O.D. grinding.

It's because both G Bond and BE Bond wheels are so well adapted to cylindrical and centerless grinding. They hold each abrasive grain for maximum cutting action — and outperform all other wheels in many grinding operations, precision or semi-precision. The new Norton "44" ALUNDUM abrasive is proving to be the most outstanding non-premium-priced abrasive for many O.D. grinding jobs.

Note how these wheels can add the "Touch of Gold" that will boost your own product quality and profits. And remember: only Norton offers you such long experience in grinding wheels and grinding machines to help you produce more at lower cost.

Typical Performance Reports on "44" ALUNDUM* Abrasive



CYLINDRICAL GRINDING

A Wisconsin plant, grinding 2" to 4" diameter steel shafts, 12" length, reports 44 ALUNDUM wheels (44A54-KVBE) cut faster and cooler with no sacrifice of wheel life, compared with best previously used wheels.

A Michigan plant, grinding miscellaneous high speed steel bolt heading dies, finds 44 ALUNDUM wheels best. Reasons are more pieces per dressing, cooler cutting action and 30% longer wheel life than formerly used wheels.

A New Jersey plant found a 44 ALUNDUM wheel (44A36-MVBE), plunge grinding different steel parts, gave many more pieces per dressing and averaged 15% longer life than wheels they used before.

CENTERLESS GRINDING

A Michigan plant, of the smaller jobbing types, grinding all kinds of materials. They prefer 44 ALUNDUM wheels (44A801-NVBE) for versatility, less dressing and faster cutting — including 10-hour completion of a job which used to take 14 hours.

An Ohio plant removes .008" on the rough grind and .003" on the semi-finish grinding of No. 1010 steel crankshaft pins. While standard wheels gave an average of 600 pieces per dressing, they report a 44 ALUNDUM wheel produced 1,000 pieces. All stock was removed in one pass, compared with two passes formerly required.

Another Michigan plant, of large size, tested a 44 ALUNDUM wheel in grinding hardened steel tappets. They report more pieces per dressing, faster cut and less burn than ever obtained before.

Ask Your Norton Distributor

for further proof of how Norton O.D. wheels can bring you best possible results. He'll gladly arrange a test in your plant. Distributors in all industrial areas listed under "Grinding Wheels" in the yellow pages of your telephone book. Behr-Manning Division, Troy, New York. *Export:* Norton Behr-Manning Overseas, Inc.

For information write Norton Company, Worcester 6, Mass.

W-1774

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS:
Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING PRODUCTS:
Coated Abrasives • Sharpening Stones
Behr-cat Tapes

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

... the two-way answer to fastening problems

Here's a combination that slashes production costs and gets rid of fastening problems in a hurry—Milford Rivets made to high-quality standards to assure a better finished product for you . . . Milford automatic rivet-setting machines that can be quickly adapted to your particular fastening needs.

To improve product appearance and strength
. . . to take full advantage of automatic assembly
. . . to cut delivery time and production costs
—get in touch with Milford first!

THE MILFORD RIVET
MILFORD RIVET & MACHINE CO.
MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA
ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

LETTERS

(Concluded from page 10)

atomic energy field.

We feel that the APPR is unique in that it is the first nuclear reactor of its type in the U.S. specifically designed for the production of electric energy. A company that has entered the atomic power field to the extent that Alco has is naturally interested in receiving mention where such mention appears justified.

Roger C. Witherell
Manager-News Bureau
Alco Products Inc.
Schenectady, N.Y.

• *STEEL named over 20 other projects in the atomics program but did not mention the companies involved because of space limitations.*

We do appreciate the value of Alco's work at Ft. Belvoir and are sorry that it was impossible at this time to give credit where credit is certainly due.

World's First Aluminum Crane

It was with interest that I read the article, "Kaiser's New Cranes Are Aluminum" (Jan. 14, page 88). I would appreciate an extra copy.

It is stated that the cranes are the first in the nation. As a matter of interest, we manufactured a welded aluminum crane in 1949. We believe that it was the world's first.

W. F. Walker
General Manager
Provincial Engineering Ltd.
Niagara Falls, Ont.

Enticing Fabulous Future

Please send three copies of the article, "Get Set for Metalworking's Fabulous Future" (Jan. 7, page 123). It is enticing and informative.

J. Pat Beaird
President and General Manager
J. B. Beaird Co. Inc.
Shreveport, La.

Metal Powder Report Pleases

I would appreciate 15 copies of the article, "Metal Powder Parts Get New Look" (Dec. 3, page 121), for our field representatives. We are pleased to see STEEL run these occasional reports on the status of powder metallurgy.

A. L. Trumpler
Promotion Manager
Harper Electric Furnace Corp.
Buffalo

To Study Cold Heading

Your article, "Cold Heading Branches Out" (Jan. 14, page 71) has many interesting facts in it. We would like four copies.

E. H. Arnold
Commercial Research Division
Republic Steel Corp.
Cleveland

Magnets Draw Inquiry

In the Mirrors of Motordom column of Jan. 14 (page 52), there is an item entitled, "Magnets Catch On." The magnets referred to are made by the Storch Products Co., Detroit. Will you furnish us this company's address?

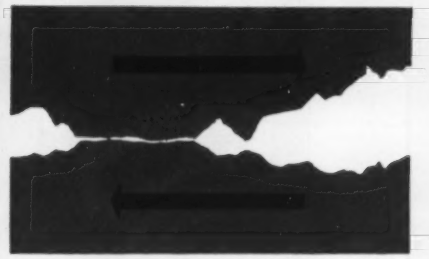
H. G. Robertson
Works Manager
American Steel Foundries
Alliance, O.

• *Storch Products Co. is located at 9232 Greenfield, Detroit, Mich.*

WHY VALVE LUBRICATION SAVES MONEY

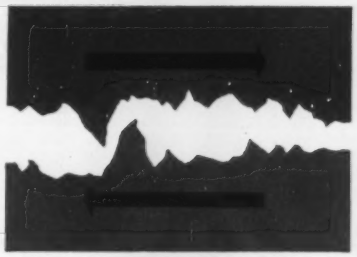
TROUBLE STARTS WHEN METAL RUBS METAL...

Under the microscope, metal that appears mirror-smooth to the naked eye shows as sharp mountains and deep valleys. This roughness, combined with the heat and pressure of metal-to-metal rubbing, causes valve trouble in the following ways:



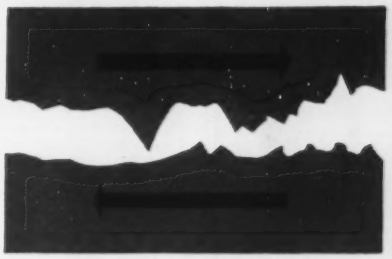
STICKING

"Cold Welding" occurs when friction or pressure welds the peaks together. The result: sticking.



SHEARING

The "hills" of one surface gouge into the hills of the other surface causing further sticking and scoring.

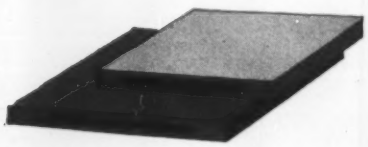


PLOWING

If one surface is even slightly harder than the other, the hard peaks act like a "plow". Leakage soon results.

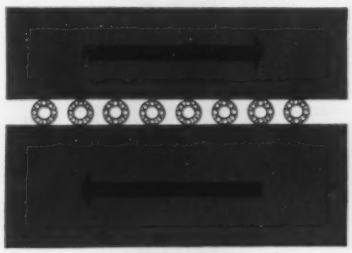
BUT, WITH ROCKWELL-NORDSTROM VALVE LUBRICATION...

metal-to-metal contact is eliminated. Here's what happens when metal-to-metal surfaces are lubricated:



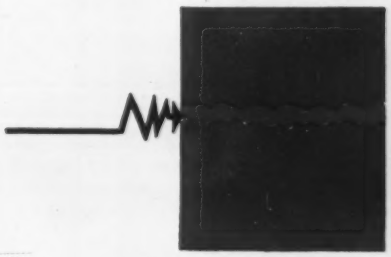
SLIDING

Lubricant prevents friction heat, eliminating danger of cold welding and assuring easy movement.



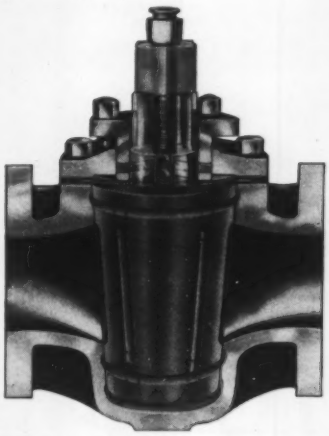
ROLLING

Lubricant becomes millions of tiny bearings . . . metal surfaces actually never come into contact with one another.



SEALING

Pressurized lubricant forms an impenetrable, continuous seal against leakage.

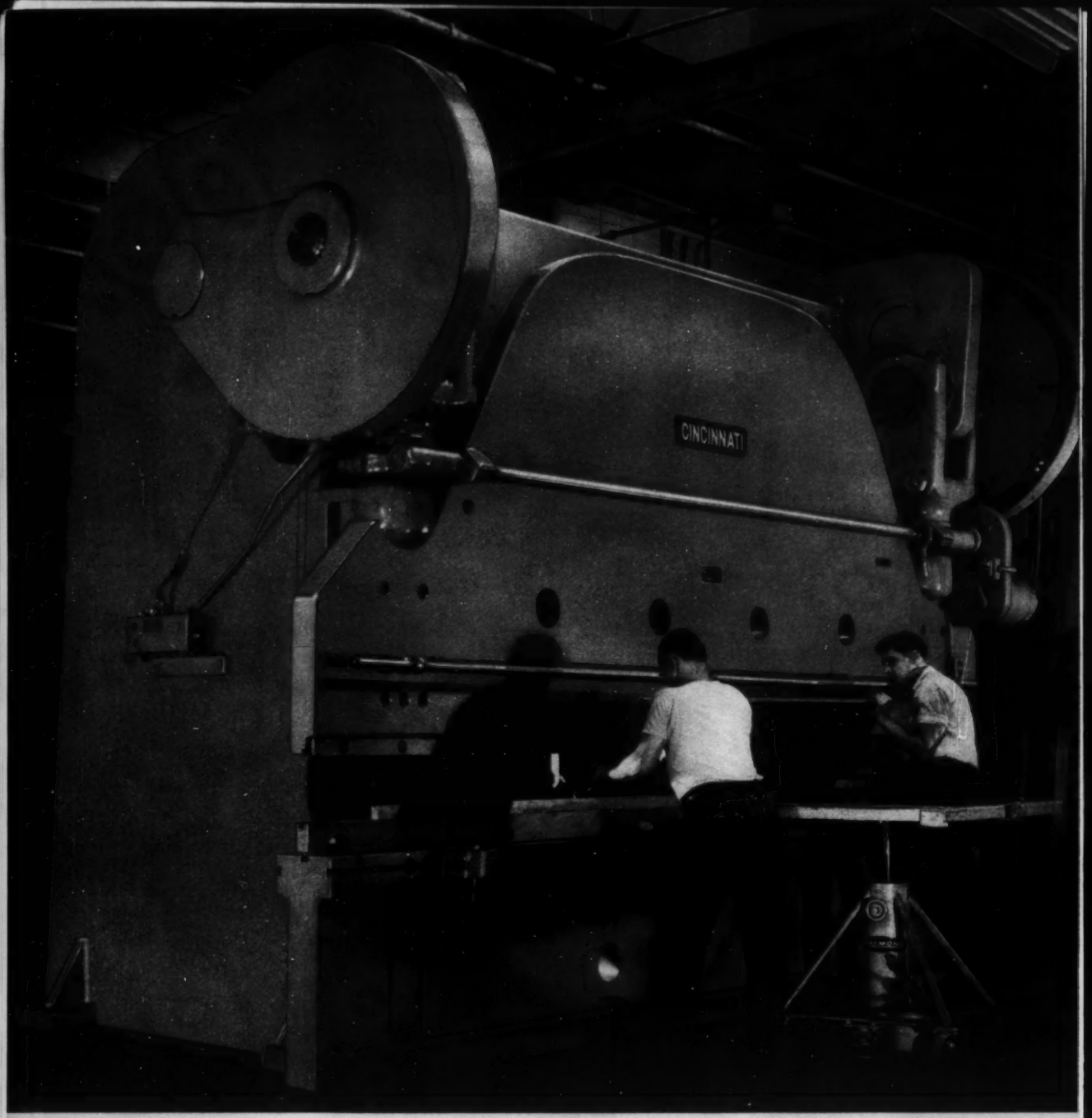


LONGER LIFE, LOWER COST, better valve service results when you specify Rockwell-Nordstrom lubricated plug valves. Notice in the drawing at the left how lubricant protects all the working surfaces and seals positively against leakage. Since lubricant eliminates adhesion, shearing and plowing, Rockwell-Nordstrom valves cost you less to use . . . year after year. Rockwell-Nordstrom valves are available in a complete range of sizes and pressure ratings to answer every flow control need. They cost no more to buy, often less, than ordinary valves. See your nearest supplier or write Rockwell Manufacturing Company, Pittsburgh 8, Pa. for complete details.

Canadian Valve Licensee: Peacock Brothers Limited

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF



This 13 Series x 12′ Cincinnati Press Brake has a capacity of 250 tons and is used for many types of forming and punching work at the Falstrom Plant.

This 2512 Series Cincinnati Shear has a capacity of ⅜″ x 12′ long mild steel plate, and is used to shear a variety of metals to micrometer accuracy.

● Photos courtesy Falstrom Company, Passaic, N. J.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

Cincinnati Shears and Press Brakes produce a wide variety of precision custom metal work

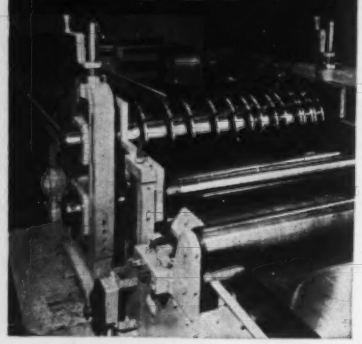
at FALSTROM COMPANY, Passaic, N. J.

Three Cincinnati Shears and five Cincinnati Press Brakes are profitable producers in this finely equipped plant. A broad variety of precision work in many different metals is done on these versatile machines, yet changes from job to job are made rapidly with minimum loss of time. Due to the accuracy of their Cincinnati Shears and Press Brakes, Falstrom Company has been able to minimize the use of welded construction in their special fabricated products.

•

Consult our Application Engineering Department about ***your*** production problems, and write Department C for Catalog S-7R on Cincinnati Shears and Catalog B-4R on Cincinnati Press Brakes.

YODER SLITTING LINES



PAY BIG DIVIDENDS WORKING ONLY ONE DAY PER WEEK!

In one plant, two Yoder tube mills and about 50 punch presses are being supplied with slit strands by one Yoder Slitting Line operated an average of only *seven hours per week.*

In another plant, a Yoder slitting line, *operated from six to eight hours per week,* is supplying two intermittently operated roll forming machines with total requirements averaging 100,000 feet per week.

These typical examples demonstrate, first, the big potential output of a relatively small, inexpensive Yoder standardized Slitting Line and, secondly, its big profitability. Assume production of only 35 tons of slit strands per 8 hour shift, one day per week, and the total per year would be 1750 tons. Estimating the saving in slitting cost at only one-half cent per lb., the total annual saving would be $17,500.00.

Besides the big convenience of doing your own slitting, such savings will often repay the investment in a few months.

The Yoder Slitter Book **is a comprehensive treatise on slitter operation and economics, with time studies, cost analyses and other useful data. It is yours for the asking.**

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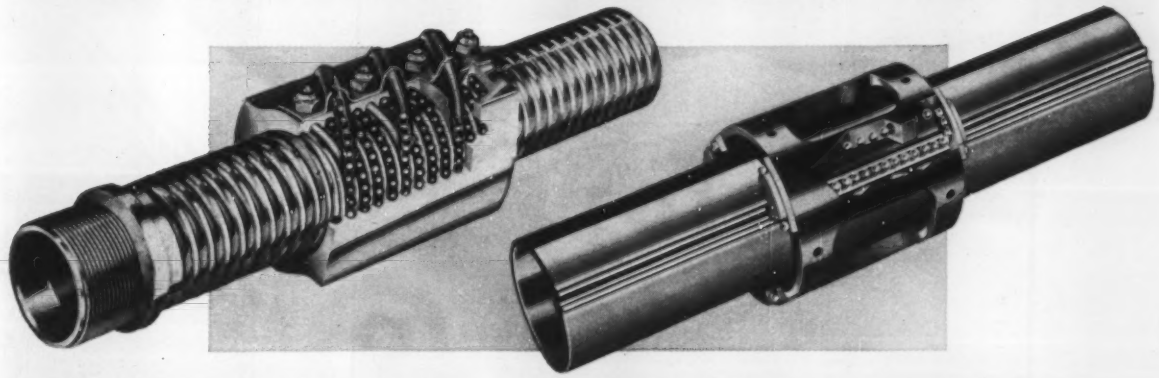
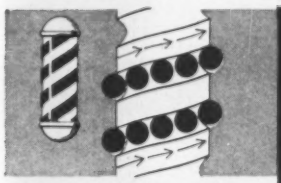
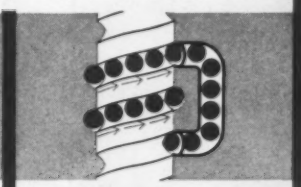


Saginaw b/b Screws guaranteed 90% efficient —offer 6 major advantages for designers

Available in custom machined and commercial rolled thread types—have been built from 1½ inches to 39½ feet long—⅜ to 10 inches diameter.



Nut *glides* on steel balls. Like stripes on a barber pole, the balls travel toward end of nut through spiral "tunnel" formed by concave threads in both screw and mating nut.



At end of trip, one or more tubular guides lead balls diagonally back across outside of nut to starting point, forming closed circuit through which balls recirculate.

1 VITAL POWER SAVINGS. With guaranteed efficiency of 90%, Saginaw b/b Screws are up to 5 times as efficient as Acme screws, require only ⅕ as much torque. This permits much smaller motors with far less drain on the electrical system. Circuitry is greatly simplified.

2 SPACE/WEIGHT REDUCTION. Saginaw b/b Screws permit use of smaller motors and gear boxes; eliminate pumps, accumulators and piping required by hydraulics. In addition, Saginaw b/b Screws themselves are smaller and lighter. Units have been engineered from 1½ in. to 39½ ft. in length.

3 PRECISE POSITIONING. Machine-ground Saginaw b/b Screws offer a great advantage over hydraulics or pneumatics because a component can be positioned at a predetermined point with precision. Tolerances on position are held within .0006 in./ft. of travel.

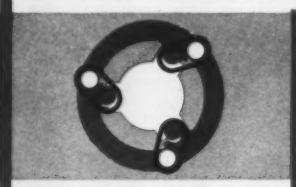
4 TEMPERATURE TOLERANCE. Normal operating range is from −75° to +275° F., but assemblies have been designed in selected materials which function efficiently as high as +900° F. These units are practical where hydraulic fluids have lost efficiency or reached their flash point.

5 LUBRICATION LATITUDE. Even if lubrication fails or cannot originally be provided because of extreme temperatures or other problems, Saginaw b/b Screws will still operate with remarkable efficiency. Saginaw units have been designed, built and qualified for operation without any lubrication.

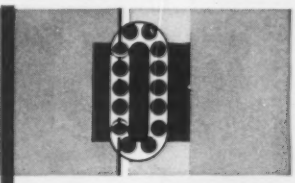
6 FAIL-SAFE PERFORMANCE. Far less vulnerable than hydraulics. In addition, Saginaw offers three significant advantages over other makes: (1) Gothic arch grooves eliminate dirt sensitivity, increase ball life; (2) yoke deflectors and (3) multiple circuits provide added assurance against operating failure.

Saginaw b/b Splines average 40 times lower friction coefficient than sliding splines

Transmit or restrain high torque loads far more efficiently—have been built from 3 inches to 10 feet long—⅜ inch to 6 inches in diameter.



The *Saginaw b/b Spline* radically increases the efficiency of transmitting or restraining high torque loads. Instead of *sliding* against each other, surfaces *glide* on rolling balls.



The steel balls recirculate in closed circuits formed by mating longitudinal raceways spaced around the circumference of inner and outer splines. Guides return balls.

This revolutionary new kind of spline utilizes the same basic principle pioneered by Saginaw in the ball/bearing screw.

It permits new engineering designs never before practical—literally lets you achieve the "impossible"! In any application where column length must change under torque load, the Saginaw b/b Spline offers greatly decreased friction, less wear, longer life, more dependable operation. It can be fitted with integral gears, clutch dogs, bearing and sprocket seats or a wide choice of other attachments for use with electric, hydraulic or pneumatic units. To convert push-pull to rotary motion, helical types are available with very high leads, ranging from 20:1 to 100:1.

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b/b Screw and Spline Operation
Dept. 4N, Saginaw, Michigan

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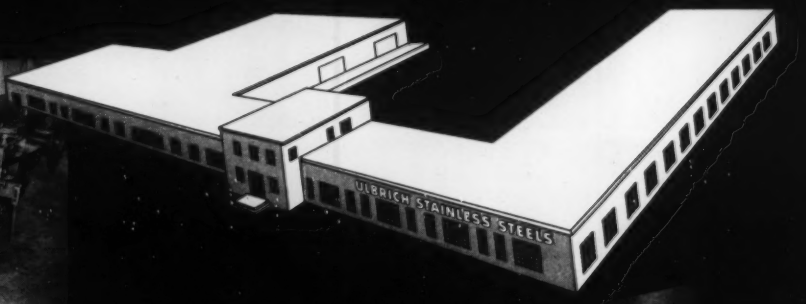
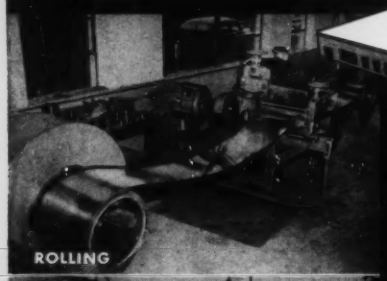
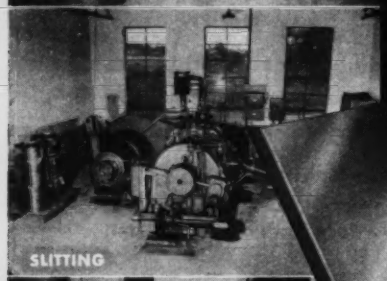



ROLLING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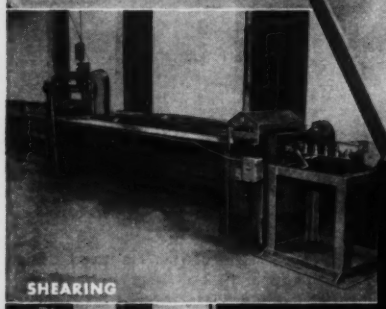
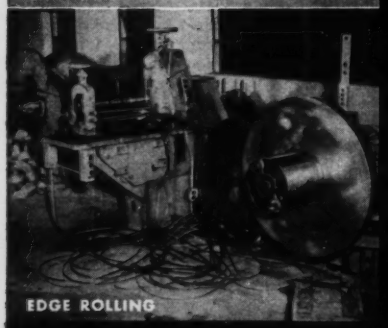

SHEARING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One foot or one pound and up
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LIGHT ISN'T WASTED UP HERE

MORE LIGHT IS REFLECTED TO THE WORK AREA DOWN HERE

Stop paying for wasted light

SWITCH TO GENERAL ELECTRIC REFLECTOR LAMPS, GET MORE LIGHT—SAVE MONEY, TOO!

TO GET MORE LIGHT ON THE JOB . . . OVERNIGHT just switch to General Electric Reflector Lamps in your filament or mercury lamp systems. It's as easy as a twist of the wrist. The reflectors are sealed *inside* the bulbs where they can never get dirty. You get up to 78% more light on the work . . . where you want it. There's a size to fit your present system; no need to buy new fixtures or sockets.

YOU SAVE MAINTENANCE DOLLARS, TOO. You seldom if ever have to clean fixtures. Maintenance is reduced to changing burnouts—and the uniform life of General Electric Lamps makes it possible to change burnouts on a regular schedule.

CHOOSE FROM THESE FILAMENT REFLECTOR LAMPS. General Electric's 500- and 750-watt filament reflector lamps are available in standard or high voltage, and 1000-watt in standard voltage. Their sealed-in, pure silver reflectors never need cleaning.

CHOOSE FROM THESE MERCURY REFLECTOR LAMPS. (1) The General Electric RW-1 with white phosphor reflector is the newest, and gives you the most light at lowest cost in most areas. Also you get better, whiter light, than from any clear lamp. (2) The RC-1 with phosphor reflector gives you extra light (only 7% less than the RW-1) *and* color improvement, too. (3) The R-1 has a pure silver reflector; is best for extremely dirty areas.

RW-1

RC-15

And if you're now using 1000-watt Mercury Lamps, try the new *half*-phosphored G-E 1000-watt Mercury Reflector Lamps (either RC-15 or RC-12). All lamps are interchangeable with comparable clear lamps.

Your General Electric Lamp specialist will be glad to help you pick the best G-E Reflector Lamp for your plant. Contact him now—or write: General Electric Co., Large Lamp Dept., Nela Park, Cleveland 12, Ohio.

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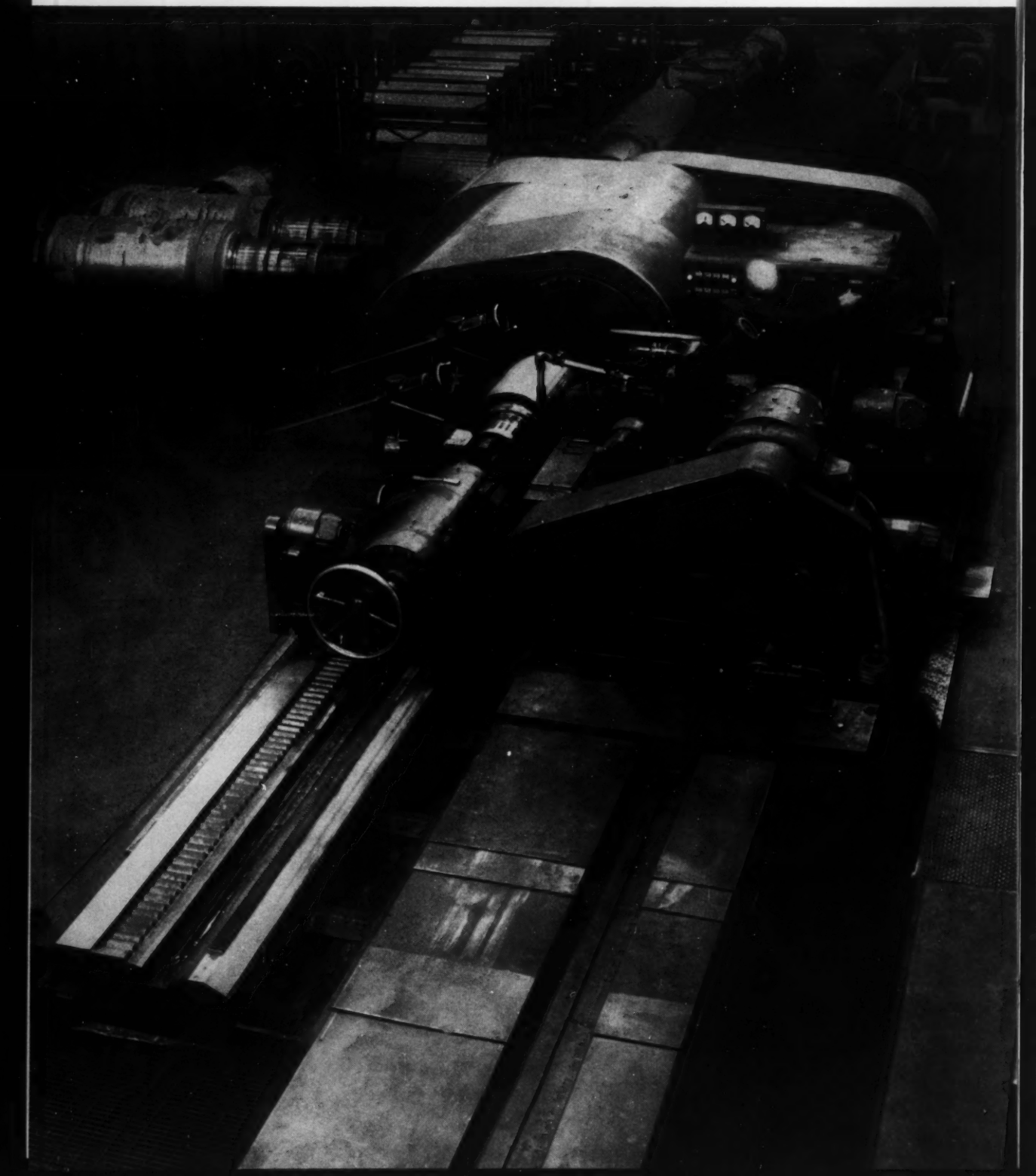
Outstanding features of Landis roll grinders

. . . assure accurate contours,

A Landis 50" x 192" Type 30 Roll Grinder in operation at a large steel mill.



speed operations and reduce costs

mirror finishes and short set-up time

Fine finishes assured by

Microsphere wheel spindle bearings
All vee belt work drive
Heavy cast bed
Rigidized grinding wheel spindle

Accurate straight or shaped rolls assured by

Landis crowning and concaving mechanism
Precision grinding wheel feed
Heavy duty adjustable roll heads

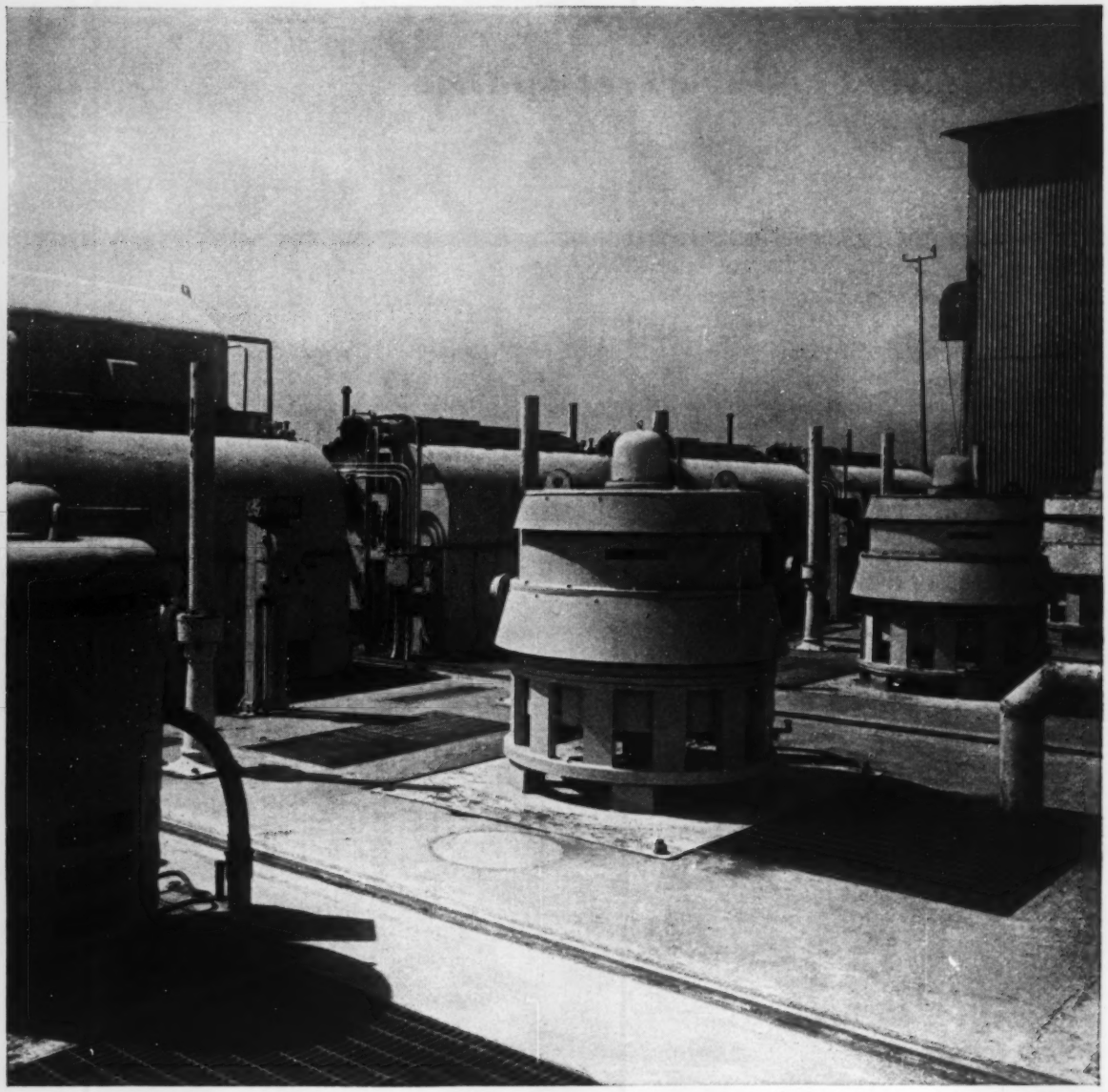
Short setup time assured by

Grouped operating controls
Variable speed work drive
Variable speed carriage traverse
Power movement of grinding wheel head
Ample power to start heavy rolls

Reflection on roll demonstrates mirror finish grinding done on Landis Type 30 Roll Grinders.

LANDIS
precision grinders

LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA



Four Fairbanks-Morse low-lift propeller pumps at Fairless

Delaware Borrow

Every day the Fairless Works takes 230 million gallons of water from the Delaware River, uses it in the production of iron and steel, and after treatment returns it to the river. The "big borrow" is started in a plant pumping station equipped with ten Fairbanks-Morse propeller and turbine pumps in efficiently chosen sizes up to 48 inches.

There are pumps in the Fairbanks-Morse line to move any magnitude of industrial water supply at any appropriate pressure, and other pumps to meet ordinary or unusual problems of industrial wastes treatment and disposal. A Fairbanks-Morse hydraulics engineer will be happy to work with your engineers or consultants in specifying the right pump for your specific job. Fairbanks, Morse & Co., Dept. S-2, 600 South Michigan Avenue, Chicago 5, Illinois.

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a name worth remembering when you want the BEST

PUMPS · SCALES · DIESEL LOCOMOTIVES AND ENGINES · ELECTRICAL MACHINERY · RAIL CARS · HOME WATER SERVICE EQUIPMENT · MOWERS · MAGNETOS

CALENDAR
OF MEETINGS

Feb. 24-28, American Institute of Mining, Metallurgical & Petroleum Engineers: Annual meeting, Roosevelt and Jung hotels, New Orleans. Institute's address: 29 W. 39th St., New York 18, N.Y. Secretary: E. O. Kirkendall.

Feb. 25-27, American Management Association: Annual special conference on electronics, Hotel Statler, New York. Association's address: 1515 Broadway, New York 36, N.Y. Secretary: Andrew P. Donovan.

Feb. 25-Mar. 1, International Heating & Air Conditioning Exposition: International Amphitheatre, Chicago. Information: International Exposition Co., 480 Lexington Ave., New York 17, N.Y. President: E. K. Stevens.

Mar. 5-7, American Machine Tool Distributors Association: Spring meeting, El Mirador hotel, Palm Springs, Calif. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Mar. 5-7, Society of Automotive Engineers Inc.: National passenger car, body and materials meeting, Sheraton-Cadillac hotel, Detroit. Society's address: 485 Lexington Ave., New York 17, N.Y. Secretary: John A. C. Warner.

Mar. 6-8, Pressed Metal Institute: Annual spring technical meeting, Carter hotel, Cleveland. Institute's address: 3673 Lee Rd., Cleveland 20, O. Managing director: H. A. Daschner.

Mar. 10-13, National Association of Waste Material Dealers Inc.: Annual convention, Conrad Hilton hotel, Chicago. Association's address: 271 Madison Ave., New York 16, N.Y. Managing director: Clinton M. White.

Mar. 11-15, National Association of Manufacturers: Institute on industrial relations, Hollywood Beach hotel, Hollywood, Fla. Association's address: 2 E. 49th St., New York 17, N.Y. Information: Sybyl S. Patterson, associate director, Industrial Relations Division, National Association of Manufacturers.

Mar. 11-15, 1957 Nuclear Congress: Convention Hall, Philadelphia. Co-ordinator: Engineers Joint Council, 29 W. 39th St., New York 18, N.Y.

Mar. 13-15, National Fluid Power Association: Annual meeting, Hollywood Beach hotel, Hollywood, Fla. Association's address: 1618 Orrington Ave., Evanston, Ill. Executive secretary: Barrett Rogers.

Mar. 13-15, Radio-Electronics-Television Manufacturers Association: Spring meeting, Sheraton Park hotel, Washington. Association's address: 777 14th St. N.W., Washington 5, D.C. Secretary: James D. Secrest.

Mar. 14-15, National Industrial Conference Board: Atomic energy conference, Benjamin Franklin hotel, Philadelphia. Board's address: 460 Park Ave., New York 22, N.Y. Secretary: Herbert S. Briggs.

Mar. 17-19, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland 13, O. Secretary: George K. Dreher.

Mar. 18-21, Society of the Plastics Industry Inc.: Annual national conference and plastics exposition, Biltmore hotel and Shrine Hall, Los Angeles. Society's address: 250 Park Ave., New York 17, N.Y. Executive vice president: William T. Cruse.

Mar. 18-21, American Society of Mechanical Engineers: Gas turbine power conference, Sheraton-Cadillac hotel, Detroit. Society's address: 29 W. 39th St., New York 18, N.Y. Secretary: C. E. Davies.

Mar. 20-22, Society of Automotive Engineers Inc.: National production meeting and forum, Hotel Statler, Buffalo. Society's address: 485 Lexington Ave., New York 17, N.Y. Secretary: John A. C. Warner.

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Getting the job done is important. Hamilton Foundry recognizes this . . . gets your order into production with the maximum speed consistent with maintaining *quality*.

Hamilton Foundry places a new interpretation on service. "Handspring Service" means more than simply on-time delivery. It puts into action some of the finest engineering background in the business...gives you the advantage of 75 years of specialization in producing *quality* castings.

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THE HAMILTON FOUNDRY AND MACHINE CO.
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(Top) Heating a wide face shaft pinion for hardening with Selas Duradiant burners at Baldwin-Lima-Hamilton. (Lower) Narrow face gear being heated by Selas Superheat burners at Wiedemann Machine Co.

FUEL COST 11.4c

PER 52-POUND GEAR *with Selas Heat Processing*

For hardening gears, pinions, segments, rollers, rings, shafts, cylinders, wheels and cams, Selas heat processing methods are unequalled for economy, speed and versatility. With equipment as shown above, for example, 52-lb. spur gears, with 24″ pitch diameter and 1½″ face, are tooth-hardened at a rate of 10 per hour, with a fuel cost of only 11.4c each.

Selas heating, using regularly-supplied fuels (manufactured gas, natural gas or propane), premixed with air . . . permits precise localized heating . . . to develop full surface hardness and controlled depth of hardness. The operation can be fully automatic.

Bottled oxygen is not required.

In heat treating, brazing, forging, strip annealing, and other continuous operations involving both ferrous and nonferrous metals, Selas Engineers can design heat processing equipment to help speed production, improve product quality and reduce manufacturing costs.

Write for descriptive data concerning your heating requirements. Address Dept. 22.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers

DEVELOPMENT • DESIGN • CONSTRUCTION

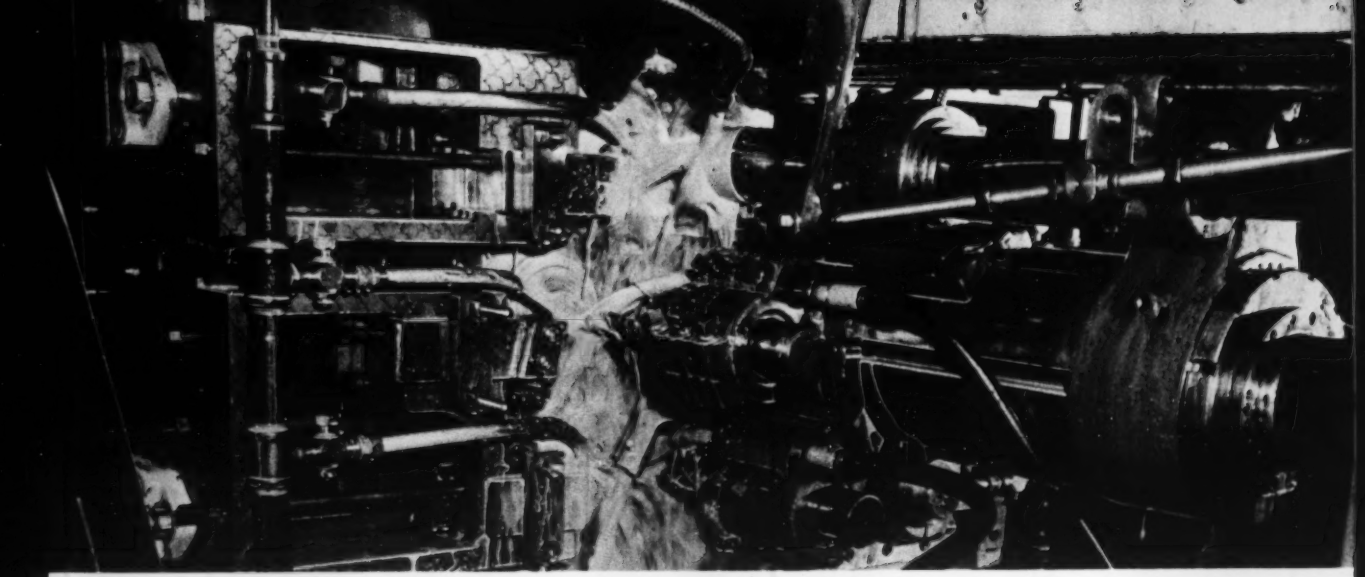
Here may be a better way ... a simpler solution to many metal processing problems ... Let's consider —

The HOUGHTON Line →

In your search for new materials that will speed up production and further improve quality, how about these, for instance:

A chemically conceived machining coolant . . . a speedier, longer-lived quench oil . . . a more effective cleaner or protective rust inhibitor . . . a lubricant so fortified by science that it will withstand the heaviest pressures.

Houghton feels entitled to speak with authority on such subjects. On the following pages we offer you some of the finer points of metalworking we have learned and developed:



MACHINING: *Clean, cool heavy*

HEAT TREATING: *Precise speedy*

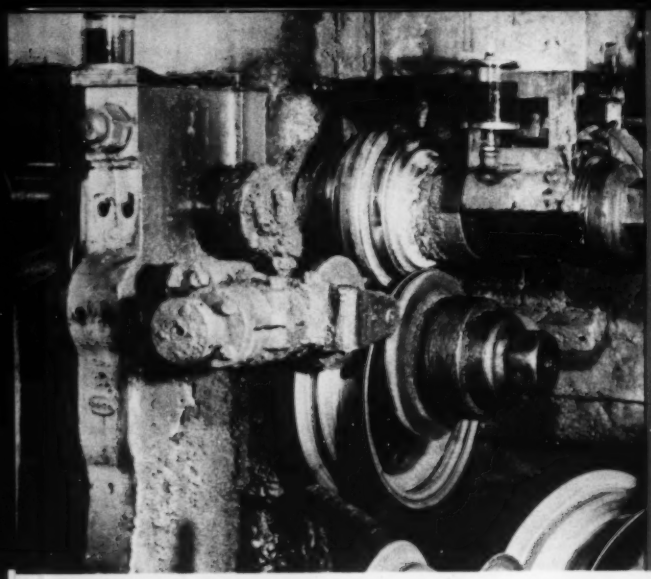
With the proper cutting fluid, modern machines can machine any metal—including new wonder alloys—far faster than what are commonly accepted as "high" speeds. Proper cooling and lubrication will do it and this you can get with Houghton's chemically conceived cutting concentrates—headed by Antisep All-Purpose Base. This premier cutting base makes heavier feeds and super-speeds possible—almost doubling production in some cases—because mixed 1:25 with water it cools as no oil can, yet is an exceptional lubricant. Other benefits: no smoke, no chip buildup, no welding, cooler work to handle and with a fine finish.

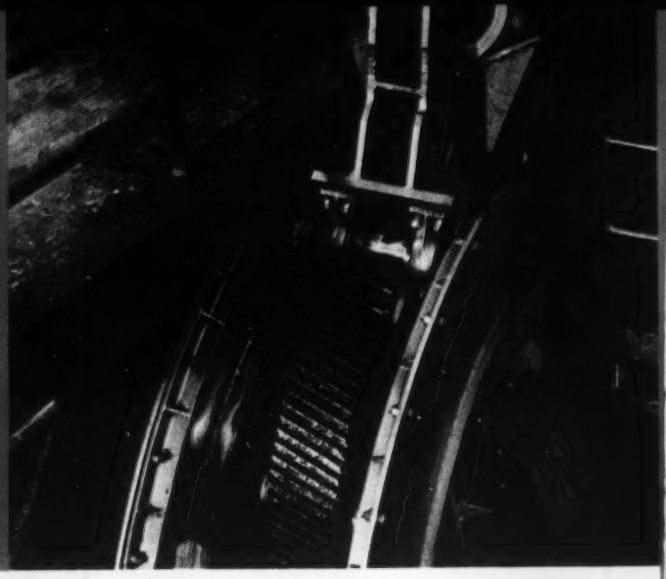
cutting... as fast as your machines can run

The HOUGHTON Line →

salt baths... quick, controlled quench

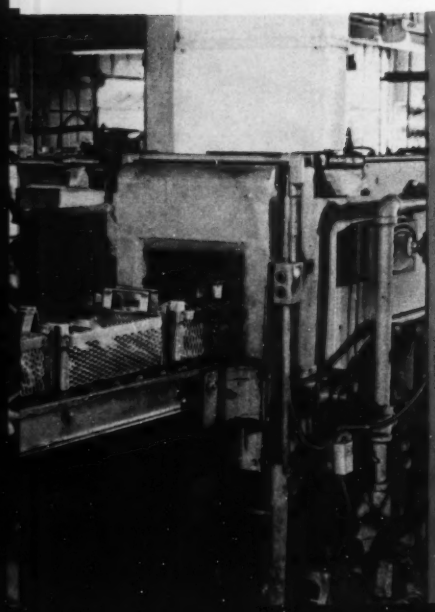
Houghton scientists pioneered the salt bath method of heat treating—increasing its speeds and broadening its versatility to fit into modern mass production. Their know-how is now available to you in a full range of ultra-modern products . . . Hardening Salts, Perliton Carburizing Salts, salt baths for tempering and quenching, and Mar-Temp and Houghto-Quench Oils. These, coupled with Houghton on-the-job metallurgical service are speeding mass production processing of steel alloys, as well as the other new metals just now coming into industrial use.

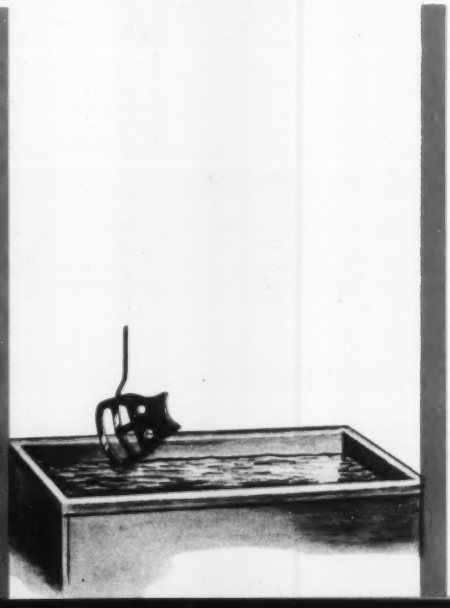


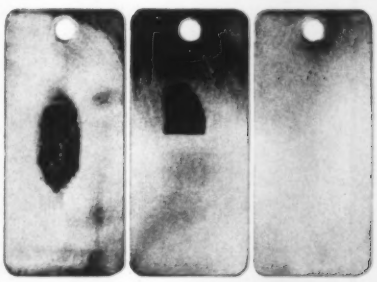


LUBRICATION: How to do a

FINISHING: Quick, easy cleaning,







Three identical fingerprinted plates. Left, bare metal. Middle, plate half immersed in Houghton Rust Veto. Right, plate completely coated. See how this neutralizer prevents corrosion!

Often to the complete amazement of plant men, long-standing lubrication problems disappear —along with their high cost—when you properly apply Houghton lubricants. There's a complete range of oils, greases and special-purpose lubricants that give superior service in problem spots, one-of-a-kind applications, or across the board.

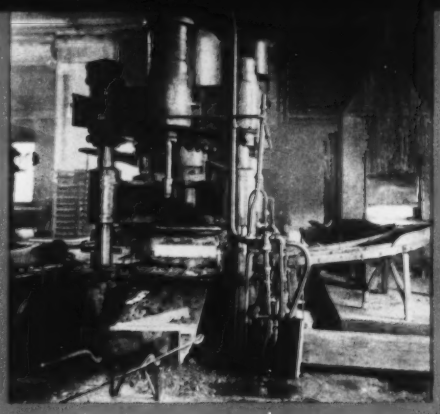
Just a few: Houghton's Sta-Put—exclusively treated for film strength, cohesion and adhesion; it won't drip out of bearings; Cosmolube multi-purpose greases—ideal in hot, cold or wet problem spots; Tenac—tough, clinging lubricant for open gears and cables; Hi-Temp Oils—for super-hot spots increasingly found in modern metal processing. All, including forming and forging lubricants, provide the same benefits . . . a top-grade lubricating job, using less lubricant, less often than with ordinary oils and greases.

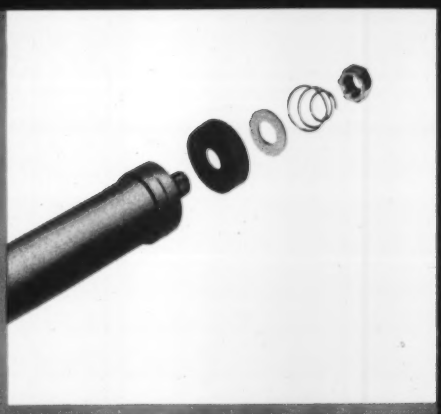
superior job with "Less Oil ... Less Often"

The HOUGHTON Line

blackening and rust prevention

Many phases of surface treatment are "naturals" for us. Steady production, lack of danger, elimination of heating costs are benefits you get with Houghton Cold Cleaners. You can do an outstanding job of blackening, easily and evenly without changing dimensions of work, with Houghto-Black. You can get sure rust prevention on finished parts, stored material—indoors or out—with one of Houghton's many use-proved Rust Veto compounds. And—you can prolong the life of pickling baths and reduce metal loss with staying-power of Acitrol pickling inhibitor.





E·F HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

HYDRAULIC FLUIDS AND PACKINGS:

Compatible components that pay their way

Fluids and packings are vital parts in every hydraulic system. When they transmit power effectively, and seal dependably, they're paying their way.

Houghton Packings and Fluids do this—and much more! For instance, the two types of Houghto-Safe fluid. One—Houghto-Safe 620—handles 85 per cent of all hydraulic requirements, paying its way with complete fire safety in addition to top-grade hydraulic properties. High temperature applications (150° operation) and systems that demand extraordinary lubrication get safety-plus-efficiency with Houghto-Safe 1020.

Where fire safety isn't demanded, Houghton supplies Hydro-Drive petroleum base oils treated four ways for trouble-free service.

In many ways Houghton VIM and VIX-SYN packings deliver more than ordinary benefits: They are available in the newest of long-wearing and super-sealing materials . . . rubber-impregnated leather and high density fabricated synthetic rubber in addition to wax-impregnated leather and homogeneous synthetic rubber. Square-shouldered Houghton cups keep their sealing power under the severest tests. "V" Packings of *all* materials fit the same gland—standard stack heights being pioneered by Houghton. Spring mounts increase efficiency of all cup packings.

Inland Ledloy*...the original leaded steels

Nearly twenty years ago, Inland started a metalworking revolution with its discovery of how to add lead to steel. The first experimental heat and the first production heat of leaded steels were made in Inland furnaces. Since then, by unending probing, refining, and perfecting, Inland has learned the secrets of making fine leaded steels. Today, Inland, the largest producer of leaded steels, sets the standards with which all other free machining steels are compared.

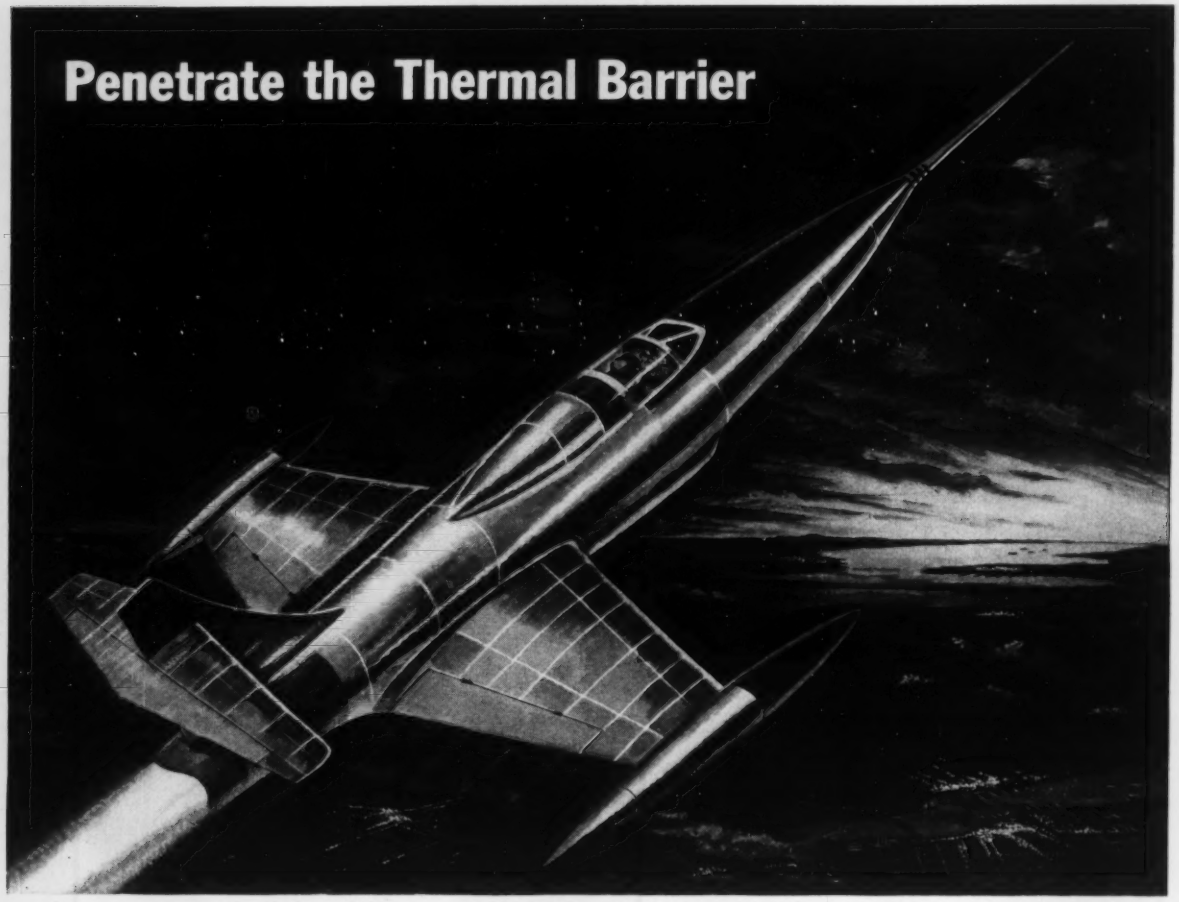
The precise gunning of 30 pounds of tiny lead pellets into 10,000 pounds of molten steel is the most critical step in the production of leaded steels. The combined experience of the crew assigned to this exacting operation is one of the key reasons for the consistently high quality of Inland Ledloy steels.

The addition of lead does amazing things to the machinability of steel without affecting any of its desirable mechanical properties. A switch to Ledloy that results in a 50% increase in production rate is not uncommon, and, in some automatic screw machine operations, Ledloy has replaced brass. Inland's twenty years of experience with leaded steels helps make Ledloy steels the world's most machinable.

Experience makes Inland Ledloy better

INLAND LEDLOY is sold in cold drawn form, under various trade names, by leading cold drawers and steel warehouses from coast to coast.

***INLAND STEEL COMPANY** 38 South Dearborn Street • Chicago, Illinois Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York • *registered trade name of Inland Steel Company, pioneer in the development of leaded steels.*



MicroMach extra-high-tensile stainless steel sheets up to 48" WIDE for aircraft and missile use

As the speed of today's aircraft rapidly approaches the Thermal Barrier, conventional metals are being left far behind in the race to satisfy the structural requirements of supersonic craft. Needed are metals that can withstand the intense heat caused by air friction at high speeds and still retain their strength. One such metal, MicroMach stainless, has been in use for more than a year.

MicroMach is a special aircraft and missile grade of modified type 301 stainless steel sheet furnished to higher mechanical properties than are available in other commercial high tensile grades in the full hard condition.

These sheets are rolled to extremely close tolerances (as low as plus or minus 3%) with micro-accuracy and precise uniformity of gauge. The surface of MicroMach sheet is smooth, clean and dense; qualities so important in minimizing surface friction.

For further information write to Aircraft Steels Dept.

Washington Steel *Corporation*
2-0 WOODLAND AVENUE
WASHINGTON, PA.

MicroRold stainless steel is also available in all popular grades and to meet regular government specifications. Sheets up to 36" wide can be had as thin as .005", and over 36" to 48" wide as thin as .010" in all commercial finishes and tempers.

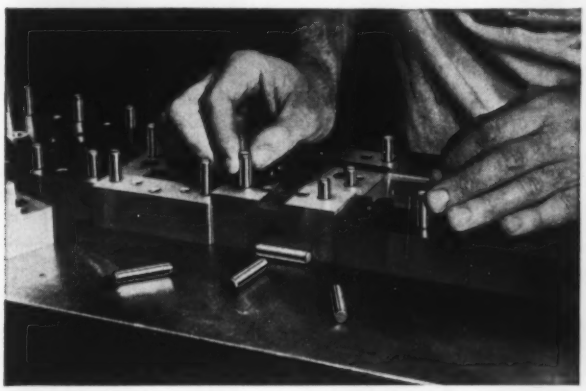
"STOCK ANSWER"
to many a design problem

ALLEN DOWEL PINS

ALLEN DOWEL PINS are being profitably employed in a thousand and one ingenious ways beyond their conventional applications in tool and die work — as economical roller bearings, as axles, precision plugs, hinges and wrist pins to name a few.

If you have an application that will utilize the great strength, accuracy and fine finish of Allen Dowel Pins, you can save substantially on the cost of your product — because you can secure them at favorable prices right from your Allen Distributor's stock.

Check the quick facts at the right and write directly to Allen's Engineering Department for further technical information.



SPECIFICATIONS

- Made from Allenoy heat treated steel. Surface hardness 62-64, Rockwell C scale; core hardness 52-54. Case depth .010″ to .020″ depending on size.
- Single shear strength 160,000 to 180,000 p.s.i.
- Surfaces precision ground to ± .0001″ with micro-inch finish of 6 RMS max.
- Sizes: Diameters, ⅛″ to 1″. Lengths, ⅜″ to 6″.
- Two standard oversizes — .0002 for press fits between mating parts, or .001 for repair work, or holes machined oversize.

ALLEN HEAD

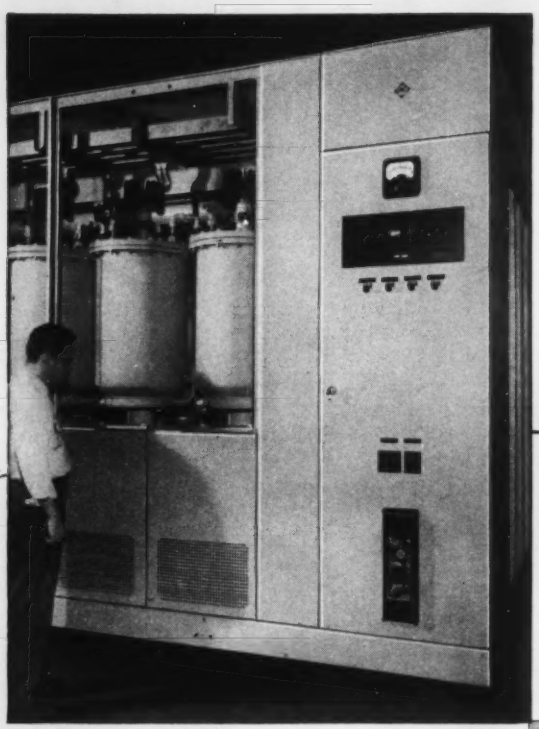
ALLEN

MANUFACTURING COMPANY

Hartford 2, Connecticut, U.S.A.

Two Separate Circuits Mean

Reliable Rectifier Operation



ALLIS-CHALMERS

Mercury Arc Rectifiers

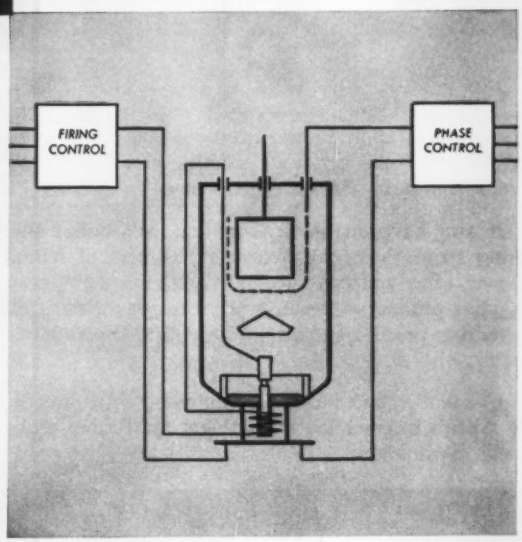
One of four metal-enclosed assemblies in a midwestern installation with a total capacity of 15,000 kw at 620 volts, dc.

1. Firing Circuit

A small dc excitation arc is automatically ignited only once, when the unit is started. It is then maintained on the mercury cathode of each rectifier tube. It offers advantages similar to a pilot light. Since it is far easier to maintain an arc than to start it, this feature reduces the chance of the excitron losing excitation during power supply disturbances.

2. Phase Control Circuit

A separate circuit utilizes the deionizing grid to obtain phase control. Grid-type phase control permits operation in the clean region near the anode where ion density is lowest, instead of on the surface of the cathode mercury pool where there is turbulence and contamination. Reliability of phase control does not depend on the condition of the mercury. This is an exclusive excitron feature.



Only Excitron Rectifiers Provide Separate Circuits

for these two all-important functions. Improved operation results — one function is never sacrificed for the other — you get optimum operation from each.

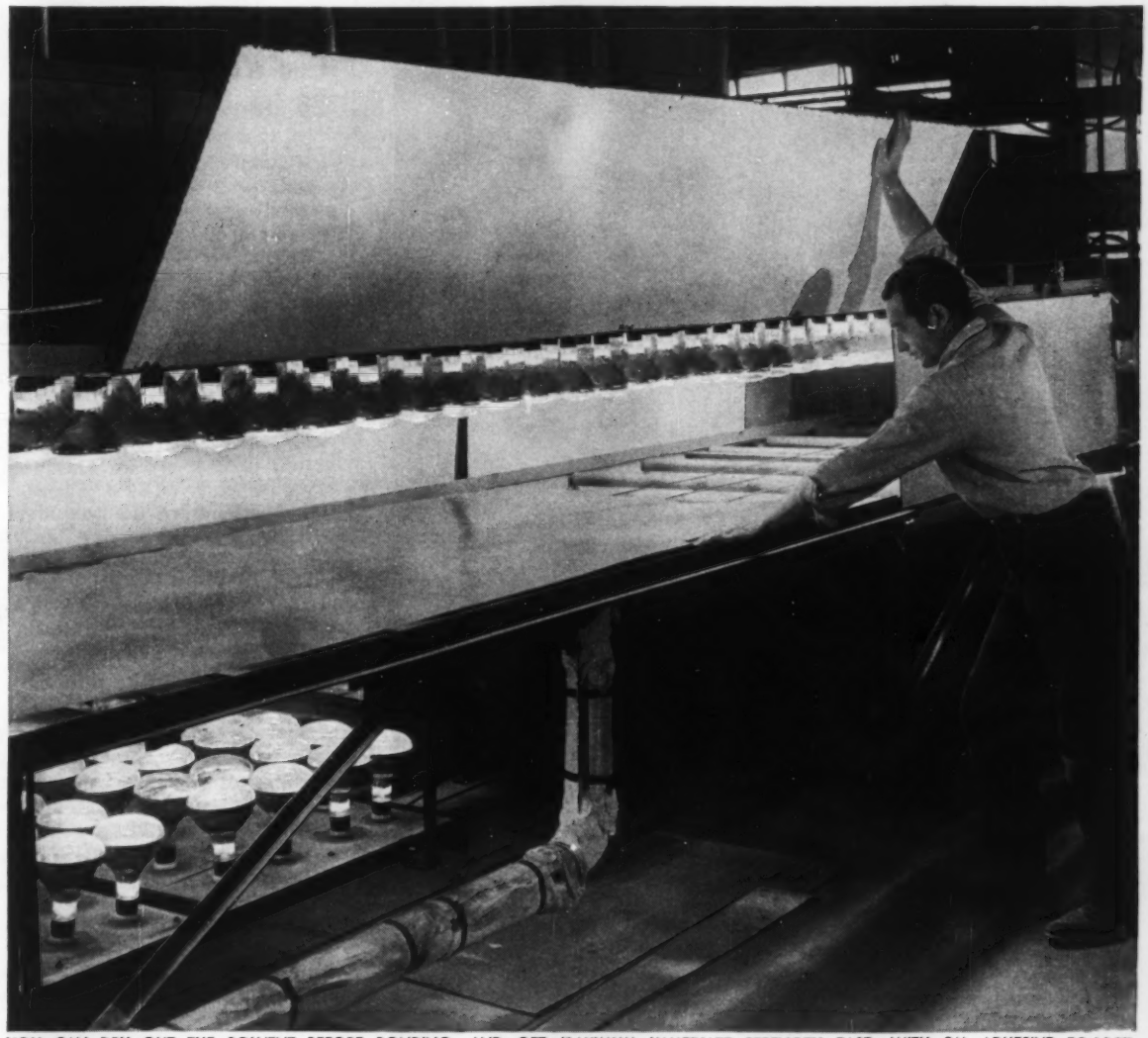
For Complete Information on rectifier operation, call your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

A-5136

Speed high-strength sandwich bonding by predrying 3M adhesive EC-1357



YOU CAN DRY OUT THE SOLVENT BEFORE BONDING—AND GET MAXIMUM IMMEDIATE STRENGTH FAST—WITH 3M ADHESIVE EC-1357.

Here's new speed in making light, rugged sandwich panels for non-load-bearing uses!

It's EC-1357. This specially formulated, fast adhesive from the laboratories of 3M gives you high bond strength *immediately!* With infrared ovens, you can dry the solvent out of EC-1357 before bonding. Heat absorption is fast, due to EC-1357's dark color. You eliminate unnecessary drying and storage time. You need no clamps or heated presses, just cold press or nip roller. What's more, this cold bond continues to cure at room temperatures—gains added strength with age.

On metal or paper honeycomb cores, EC-1357 builds up a fillet for bigger bonding area and strength. Use EC-1357 with glass foam cores, too.

SEE WHAT 3M ADHESIVES CAN DO FOR YOU! Consult 3M Research, contact your 3M Field Engineer or write on your company letterhead for information and free literature to: 3M, Dept. 62, 417 Piquette Ave., Detroit 2, Mich.

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MINNESOTA MINING AND MANUFACTURING COMPANY • ADHESIVES AND COATINGS DIVISION

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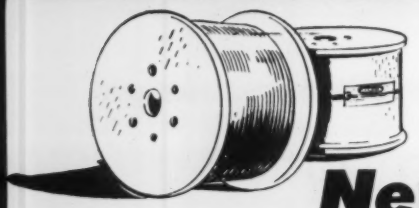
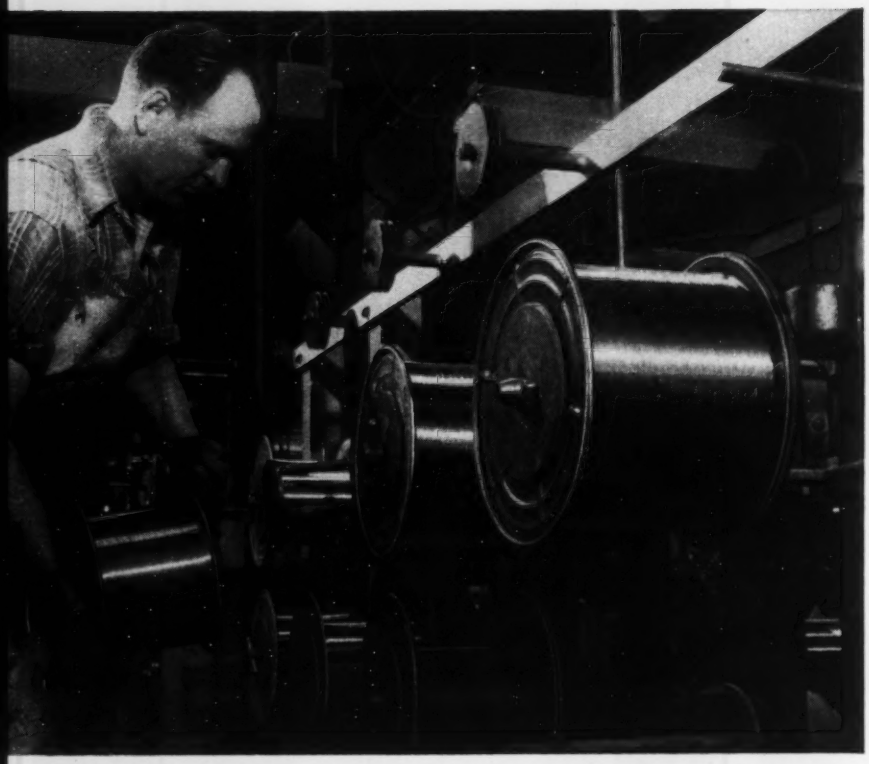


New Discard-a-Spool
Reduces Thermoid's Wire Rewind Loss to ½ of 1%



Light-weight Discard-a-Spool fits easily and quickly on let-off equipment.

Discard-a-Spool cut wire losses in rewinding to less than ½ of 1 per cent.

(Advertisement)

Johnson Steel's New One-Way Spool Weighs 28 Ounces vs. 200 Ounces

In a mountain-lined valley in Utah, a year-long test of an improved method of packaging fine wire has been stamped "a complete success."

Thermoid Western Division, Thermoid Company, Trenton, N. J., one of the nation's top manufacturers of wire-reinforced rubber hose, has given full approval to Johnson Steel & Wire Co.'s new Discard-a-Spool.

Light-weight, non-returnable Discard-a-Spool underwent testing in actual production at Thermoid's plant for many months. The result: now Thermoid specifies that all hose wire be delivered on new Discard-a-Spools.

Discard-a-Spool offers you these advantages over competitive packaging methods, whether made of metal or tempered Masonite:

- **It weighs only 28 ounces** and slashes tare weight by 14 times.
- **Fully protects the high quality** hose wire from contaminants and in-shipment damages. Overlaps and tangles are eliminated, the wire's critical surface finish is guarded.
- **Shrinks Thermoid's wire losses** in re-winding to less than ½ of 1 per cent.

Through substitution of Discard-a-Spool for the heavier, must-be-returned steel spool formerly used, Thermoid computes substantial savings.

A typical package of the new wire consists of 36 Discard-a-Spools in a sturdy, two-layer cardboard box. The box is steel-strapped to a wooden pallet for easy handling by fork-lifts. The entire package weighs approximately 2,385 pounds gross, or 2,250 pounds net, producing a tare weight of 135 pounds.

Using outmoded, heavy spools, which weighed about 12½ pounds and had to be returned to the wire mill, tare weight was 1,023 pounds for the same quantity of wire.

- **Major Supplier**—In the past 21 years, Johnson Steel & Wire has become one of Thermoid's major suppliers of hose wire for a wide variety

Johnson's high-quality hose reinforcement wire is fabricated into braids which form plies of strength around rubber tubing. As many as four braids can be plaited into reinforced rubber hose. At right, cut-away section shows plies of wire separating layers of rubber.

Johnson Steel is a major supplier of the high quality hose reinforcing wire Thermoid Western uses at its Nephi, Utah, plant. For 18 months, Thermoid cooperated with Johnson Steel & Wire Co. in extensive production tests of the new Discard-a-Spool.

of high-strength rubber hoses.

At Nephi, Utah, Thermoid's hose wire braiding machines convert Johnson's wire into plaited sheaths around rubber tubing. The number of braids in a hose is determined by the end use of the hose. Thermoid builds dozens of different types of wire braided hose, ranging from $\frac{3}{16}$th inch to 4 inches in diameter. They vary from hose with a single ply, or layer, of plaited steel wire to 4 plies of practically unbreakable wire plaiting.

In a standard 50-foot length of four-ply, 2½ inch hose, 38.5 miles of Johnson wire is used, fitting it for tough hydraulic pressure jobs like core, water and oil well drilling and sand busting in the oil fields.

Without steel reinforcing, rubber hose has a bursting resistance of only about 50 p.s.i. In the case of half-inch reinforced hose, the first ply of braid raises bursting strength from 50 p.s.i. to 10,000 p.s.i. A second layer increases it to 16,000 p.s.i. These are minimum figures, since Thermoid actually builds its hoses so that breaking points are four times maximum working pressures on the hose.

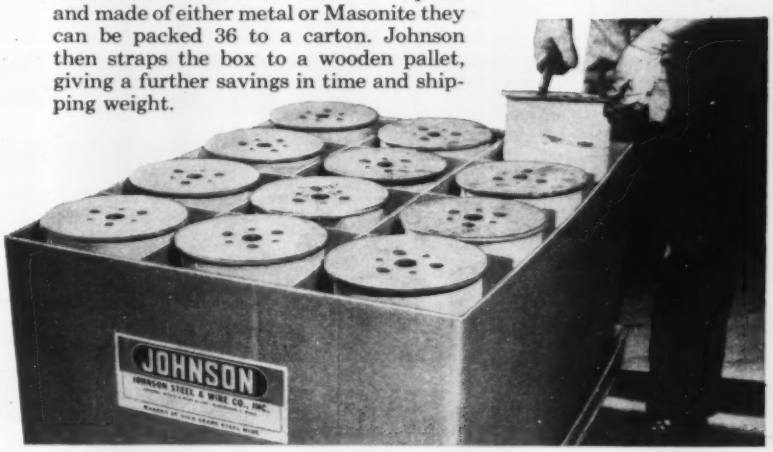
According to J. A. Muller, Thermoid's Director of Research and Development, the secret of building good hose rests on a number of factors. Among them is steel wire of high quality.

Thermoid selects Johnson wire because its structure meets or exceeds specifications. The wire surface is free of nicks which could cause premature fatigue stress or breakage during braiding operations.

• **Cleanliness Vital**—Good adhesion also requires a wire with a clean surface. To get superior adhesion Thermoid uses a dry assembly process for hose components.

These advantages of Johnson's wire are not the only benefits Thermoid gains. Johnson's products stay within the specified tensile ranges.

Discard-a-Spools are lighter and easier to handle than returnable hose wire spools and made of either metal or Masonite they can be packed 36 to a carton. Johnson then straps the box to a wooden pallet, giving a further savings in time and shipping weight.



Variations in tensile can cause serious trouble in the braiding operations.

"Any deficiency in the wire shows up in winding or during the braiding operation itself," Mr. Muller explains.

It takes up to eight hours to set up the 120 bobbins on the big braider. One bad wire is enough to jam the machine and the cost to get it set up again is figured at $245—$35 for labor and $210 for damaged and lost wire. The time lost adds still more expense.

The Utah plant, far from the nation's wire producing mills, requires tops in quality and service.

Thermoid's experience with Johnson Steel & Wire Co. demonstrates why you should let Johnson handle your fine wire supply problems.

Johnson's full range of specialty wires and its progressiveness are your guarantee of satisfaction. Let a Johnson specialist explain how top quality wire or the latest packaging improvement—like the new Discard-a-Spool—can eliminate your worries. The Johnson man is experienced and willing. He's as close as your telephone. Give him a call today.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

***a subsidiary of* Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
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(Advertisement)

Studs for NELWELD process machined from Youngstown cold finished bars

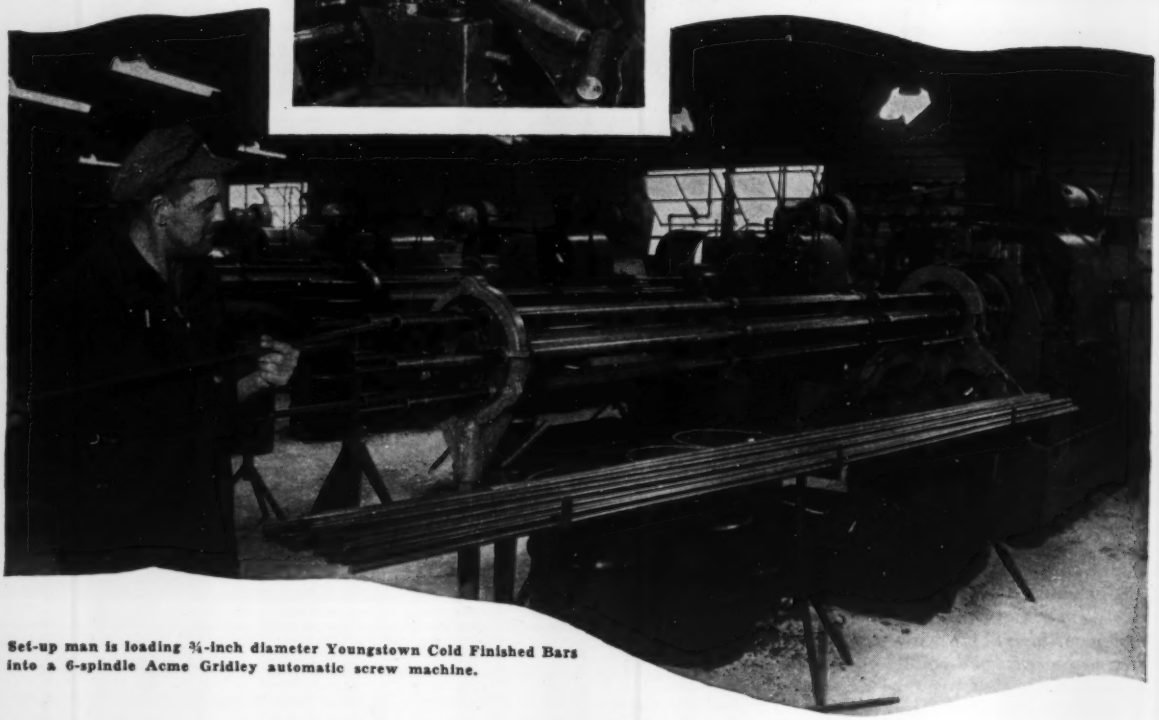
Progressive fabricators rely on the Nelweld method for fast, dependable end-welding of studs to steel surfaces. This novel electric arc process—utilizing flux-filled steel studs—substantially reduces direct fastening costs when used to replace conventional time-consuming methods such as drilling, tapping, hard welding, through-bolting or the securing of straps and rivets.

To maintain their world-wide reputation for product quality and uniformity, Nelson Stud Welding, a division of Gregory Industries, Inc., uses Youngstown Cold Finished Bars as the basic material for stud production.

Youngstown Cold Finished Bars provide high machinability and greater uniformity of composition, structure and surface finish to help you increase production of more uniform parts. Always specify Youngstown—it's your best assurance of quality.

Why not call or write your nearest Youngstown District Sales Office today for additional information or metallurgical assistance?

Close-up of studs being bored to accomodate their charge of flux (top collet) and then cut-off (center collet). Two finished Nelweld studs, shown in the pan in foreground, were machined simultaneously in the 6-position machine. First operation—feed out and face; second—bore; and third—cut-off.



Set-up man is loading ¾-inch diameter Youngstown Cold Finished Bars into a 6-spindle Acme Gridley automatic screw machine.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
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QUALITY · YOUNGSTOWN · SERVICE

Cold finished bars

NEWMAN-CROSBY STEEL HAS RAISED ITS CAPACITY 40%

with this new BLISS mill

Like many another metal producer, Newman-Crosby Steel Company is betting confidently on the continued healthy growth of the American economy! This Rhode Island producer of close-gage cold rolled strip has just raised its capacity a good 40% by installing a new Bliss 4-high reversing mill, as well as new coil-handling and heat-treating facilities.

The 6½″ and 16″ x 14″ mill is used to roll high-carbon and alloy spring steel in gages between 0.125″ and 0.010″, in widths up to 12″ and at speeds to 800 fpm. In actual operation all these design specifications have been exceeded. Bliss also designed and built the coil-handling facilities, including the two tension reels and coil buggies and the pay-off reel. Maximum limit on coil weight is 6,000 pounds.

An unusual roll drive arrangement permits wide flexibility in the choice of roll diameter. Roll speeds are synchronized electrically rather than through gears. Thus, even unmatched roll diameters can be used together successfully.

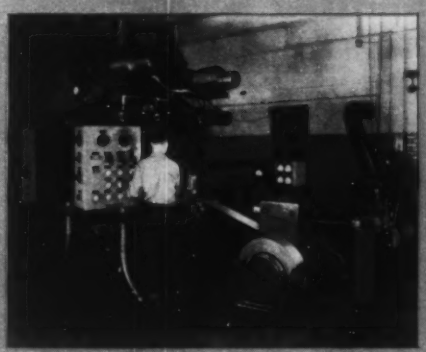
Building mill equipment to meet special needs . . . or to perform standard operations more efficiently . . . is an important reason why Bliss has become a leader in the field. If you would like more information on Bliss mill innovations, as well as details of many Bliss installations, write us today for a copy of our 60-page Rolling Mill Brochure, Catalog 40-A.

E. W. BLISS COMPANY
General Office: Canton, Ohio
ROLLING MILL DIVISION
SALEM, OHIO

BLISS
SINCE 1857

is more than a name...
it's a guarantee

The new mill has already outperformed most of the specifications set for it, rolling strip thinner, wider and faster than its original objectives of 0.010-inch gage, 12-inch width and 800 fpm speed.



Another view of the unusual new mill. Elimination of geared roll drive adapts it to use with wide variety of roll diameters to suit different rolling problems.

PLANTS: Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Pittsburgh and Midland, Pennsylvania; San Jose, California. *In Europe:* E. W. Bliss (England) Ltd., Derby; E. W. Bliss (Paris), France.

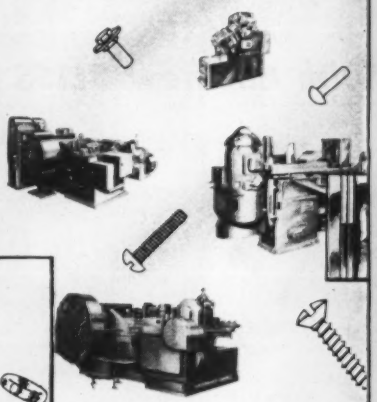
4 WATERBURY FARREL DOORS TO LOW COST PRODUCTION

The men behind these four Waterbury Farrel doors design and build machinery to help you lower your production costs.

Each Waterbury Farrel division has its own fund of specialized engineering talent and experience to draw upon in solving your specific machinery problem. And, each is backed by Waterbury Farrel's reputation of more than a century of successful machine building.

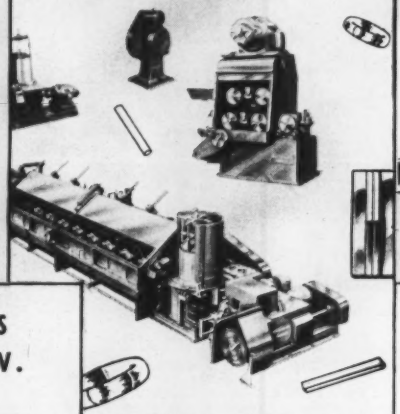
Inside the appropriate Waterbury Farrel door you'll find the engineering skill and ingenuity to evaluate your requirements and provide the proper equipment.

COLD HEADING EQUIPMENT DIV.



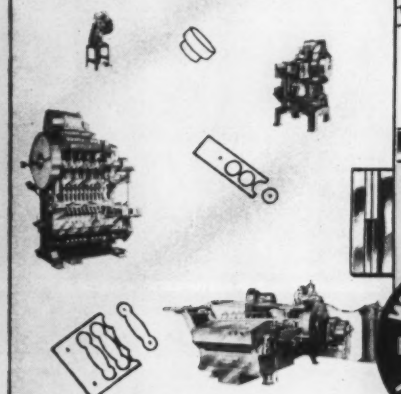
Machinery for mass production of standard and special bolts, nuts, rivets, screws and other cold formed parts.

WIRE MILL EQUIPMENT DIV.



Machinery for the economical drawing of non-ferrous wire in heavy, intermediate and fine wire sizes.

POWER PRESS EQUIPMENT DIV.

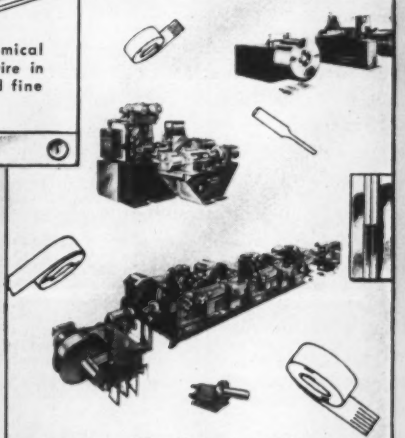


Machinery for quantity production of parts requiring blanking, stamping, forming, deep drawing, threading, trimming, beading or other operations.

WATERBURY FARREL FOUNDED 1851

Write for free "4 in 1" booklet or contact your nearest Waterbury Farrel office.

ROLLING MILL EQUIPMENT DIV.



Machinery for rolling strip, wire, rod; drawing tubes, slitting sheet stock for production, warehouse or laboratory use.

Bolt, Nut & Screw Machinery

Power Presses

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THE WATERBURY FARREL FOUNDRY & MACHINE CO.

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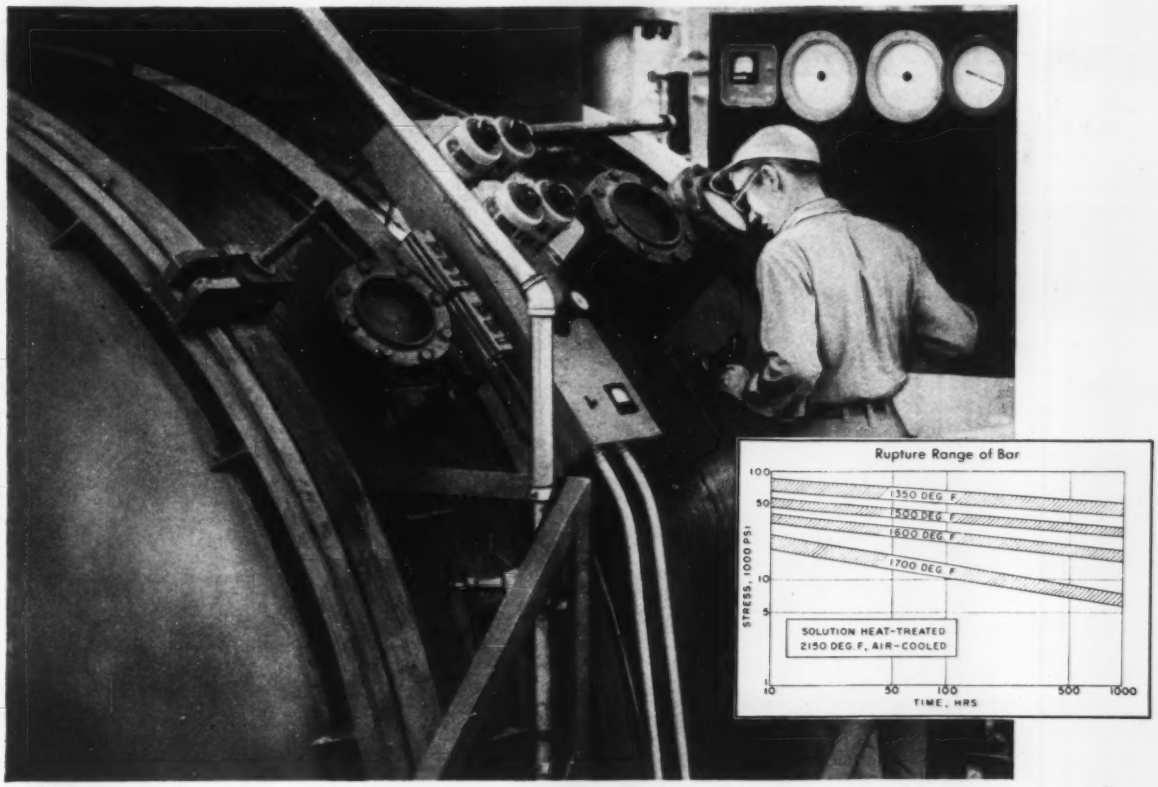

vacuum-melted HASTELLOY Alloy R-235

Trade-Mark

38,000 psi Stress-to-Rupture in 100 hrs. at 1500 deg. F

HASTELLOY alloy R-235 is a new precipitation-hardening, high-temperature alloy with outstanding properties through 1750 deg. F. In order to assure consistent high-temperature strength, it is melted and refined in special vacuum facilities at Haynes Stellite Company. The alloy has good oxidation resistance and a remarkable resistance to overaging in service. It is available in all standard wrought forms and can be forged, welded, and cold-worked. No lengthy or involved heat-treatments are necessary.

At room temperature, hot-rolled HASTELLOY alloy R-235 bar has an ultimate tensile strength of 167,000 psi, and a yield strength of the order of 100,000 psi. Strength and ductility remain relatively high from room temperature up to 1750 deg. F.

The strength of alloy R-235 under stress-rupture conditions is outstanding. Typical average stress-to-rupture in 100 hours at 1500 deg. F is 38,000 psi for bar stock, and about 37,000 psi for sheet. The alloy also has good impact strength.

If you would like information on the properties of HASTELLOY alloy R-235, get in touch with the nearest Haynes Stellite Company office. Ask for a copy of the new booklet, "HASTELLOY alloy R-235."

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

UCC

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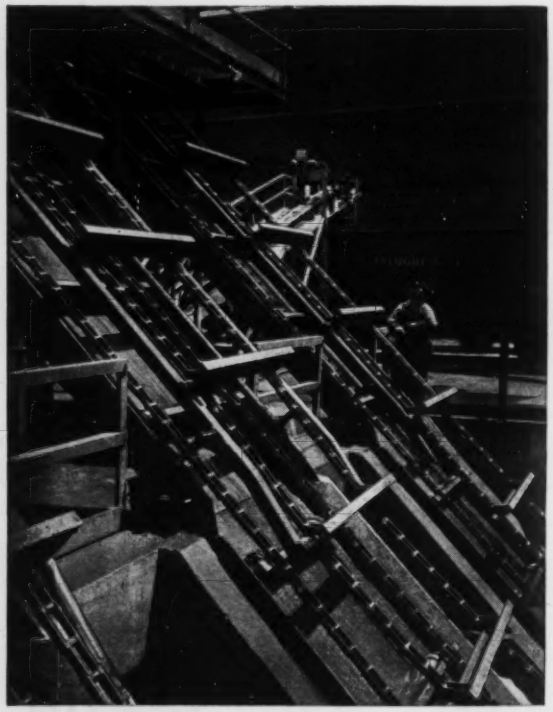
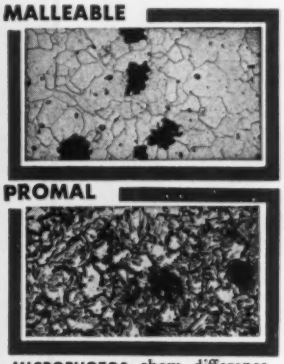
"Haynes" and "Hastelloy" are registered trade-marks of Union Carbide and Carbon Corporation.

Specify longer-lasting Link-Belt Promal chains for extra durability





MICROPHOTOS show difference between ordinary malleable iron and Promal. Upper—white areas in malleable microphoto represent "free-iron" . . . black shows soft nodules of carbon. Lower—the dark areas in the Promal structure show stronger, stiffer reinforcing material which strengthens metal and resists distortion and wear.

◀ **UP TO 475 TONS** of steel mill scale are recovered by this Link-Belt system. Class 700 Promal chain on Straightline Collector moves scale from settling tanks to discharge conveyor. Promal is especially suitable for long, heavy-duty conveyors and elevators.

Specially heat-treated malleable iron provides extra wear resistance

Fewer conveyor shutdowns and minimized replacements are economies realized by users of Link-Belt Promal chain. Its greater strength absorbs continuous impact loads — and wear resistance supplies the durability to cope with severe abrasion.

Promal is more than a partially annealed or surface-hardened malleable iron. Developed by Link-Belt, this specially heat-treated malleable iron is actually transformed into a metal of radically different physical properties. Promal, because of uniform micro-structure throughout its whole section, provides greater ultimate strength, higher yield point, exceptional fatigue resistance and a remarkable capacity to withstand abrasion.

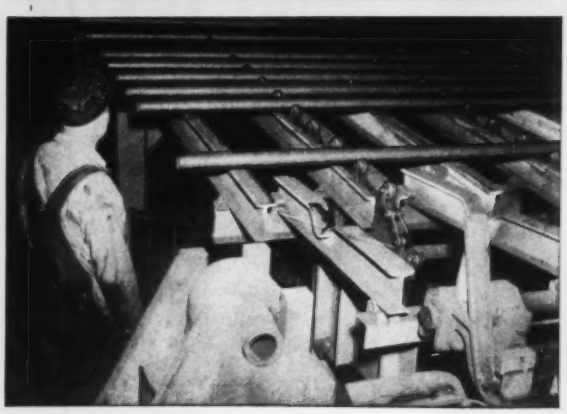
For unusually abrasive or mild corrosive conditions, Promal chain can be furnished with "file-hard" surfaces. Copper bearing or special alloy content also available.

Where and how to apply Promal in the metal working industry

Choose Link-Belt Promal chains for highly abrasive conditions—for extra strength and wear resistance demanded by heavy loads or long, sliding conveyors. They last much longer . . . cost but a little more.

The wide range of Link-Belt Promal chains available in Promal includes all types of cast and combination chains.

HEAT-RESISTANT PROMAL is recommended for temperatures up to 1000 F. This SMGL-618 Promal chain conveyor with riser attachments picks up and conveys sheet steel through furnace. Chain has operated continuously for two years without failure.



Promal chain controls uniform cooling of pipe

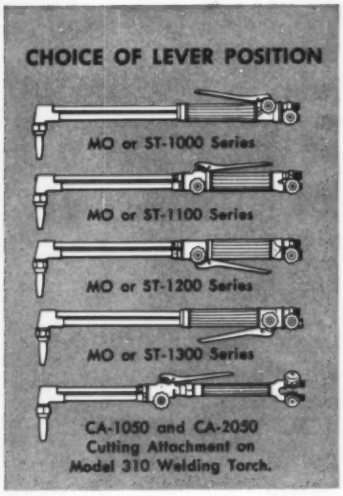
An inclined conveyor, using Link-Belt Class 1100 Promal chain with attachments, permits an Ohio steel mill to control cooling of longer tubes than previously possible. Pipe is received from hot finishing operations at temperatures up to 1800 F. Controlled chain speed permits uniform cooling of outer tube periphery.

HEADQUARTERS FOR CHAINS, SPROCKETS is your nearby Link-Belt factory branch store or authorized stock-carrying distributor. Write for 342-page Catalog 950.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,281



Select either Monel (MO) or forged bronze (ST) head; available in four lengths: 21", 27", 36" and 48", with 90°, 75° and 180°. 45° on ST models only. Same design features contained in cutting attachments, with forged bronze head.

OPERATORS PREFER

this torch for hot, tough jobs!

LICK YOUR HOTTEST JOBS

. . . solid stainless steel mixing tube absorbs heat slowly, keeps gases below flashpoint.

LAST LONGER UNDER ROUGH, TOUGH USE

. . . because they're made of toughest materials . . . special heat resisting bronze heads, forged brass bodies.

EASIER TO HANDLE, EASIER TO MAINTAIN

. . . hand-fitting oval shaped grip . . . well balanced for ease of handling . . . practical design for ease of service after long use.

Make your tough jobs easy, your easy jobs a pleasure . . . see your Victor dealer now!

VICTOR

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

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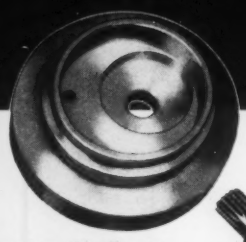
DAYSTROM
Electric Corp.

– puts it on a

RIVETT!

Battery of Rivett 1020S Lathes in the Research and Development Division of Daystrom Electric Corporation, Poughkeepsie, N. Y.



Brass piece with off-center counterbore and through-hole completely machined on a 1020S Rivett.

Machined on a 1020S from 4140 steel *after tempering* at a Rockwell hardness of C 20-25.

Productivity!

Daystrom machines model parts with an eye to normal manufacturing methods. For this reason Daystrom highlights an important Rivett feature — productivity — in its statement:

"We have found that the Rivett 1020S Lathe is one of the most useful and all around productive machines in our model shop, and is so constructed that it is easy for an average operator to obtain the dimensions and finish necessary in our work."

"Model work requires holding concentricity to .001" T.I.R. between several diameters; turning is often held to several tenths. And, a finish of 32 micro inches and better is quite easily obtained!"

Inquire about the 1020 Toolroom Precision Lathe now. Write for 16-page catalog and the name of your nearest dealer.

RIVETT LATHE & GRINDER, INC.
Dept. ST-2, Brighton 35, Boston, Mass.

RIVETT
"Steelway" Lathes

The magic of engineered energy

In their countless functions and forms springs provide unlimited scope to those who spark design projects. Our engineers of energy offer specialized knowledge and experience, plus nationwide production facilities.

ASSOCIATED SPRING CORPORATION

General Offices: **Bristol, Connecticut**

World's Largest Manufacturers of Precision Mechanical Springs

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THE WALLACE BARNES CO., LTD.
Hamilton, Ontario, Canada

WALLACE BARNES STEEL DIVISION — Producer of High-Carbon Strip Steel

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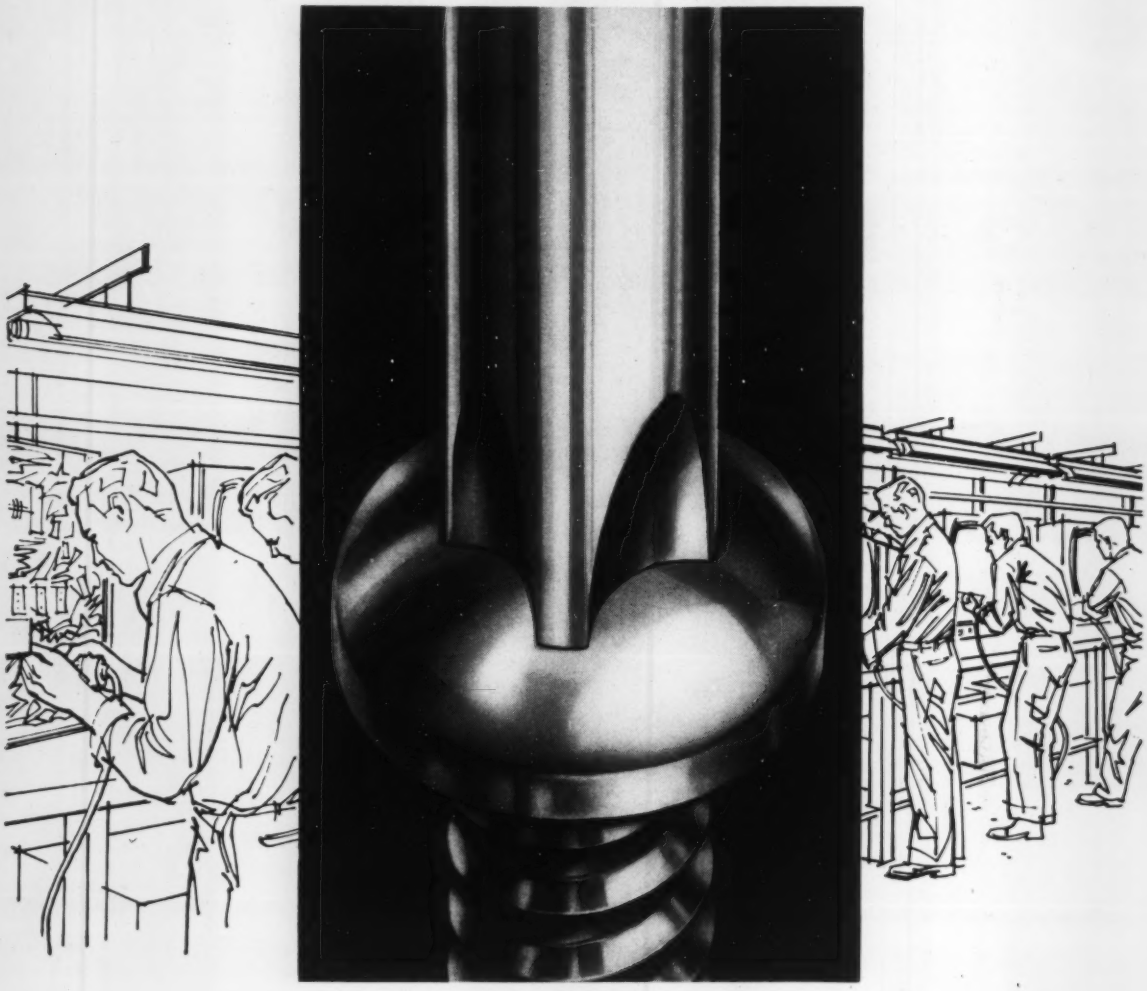


They may seem the same but...

AMERICAN is the name!

Your actual fastening costs are determined by four factors:

1. Price 2. Service 3. Quality 4. Research

In some instances, local price differentials may seem worthwhile, but no one gives you more of all four than American.

American Gives You More of All Four

In Service — where American is continually proving its ability to meet any reasonable delivery requirement regardless of geographical location.

In Quality — where production tools made to precision specifications far exceed standard requirements.

In Research — where American engineers have not only developed the universally accepted Phillips Head Fastener but have produced such exclusive products as SCREWSTICK for industries with unique fastening problems. SCREWSTICK replaces the tedious handling of individual screws with automatic power driving, resulting in cost savings exceeding 4 to 1.

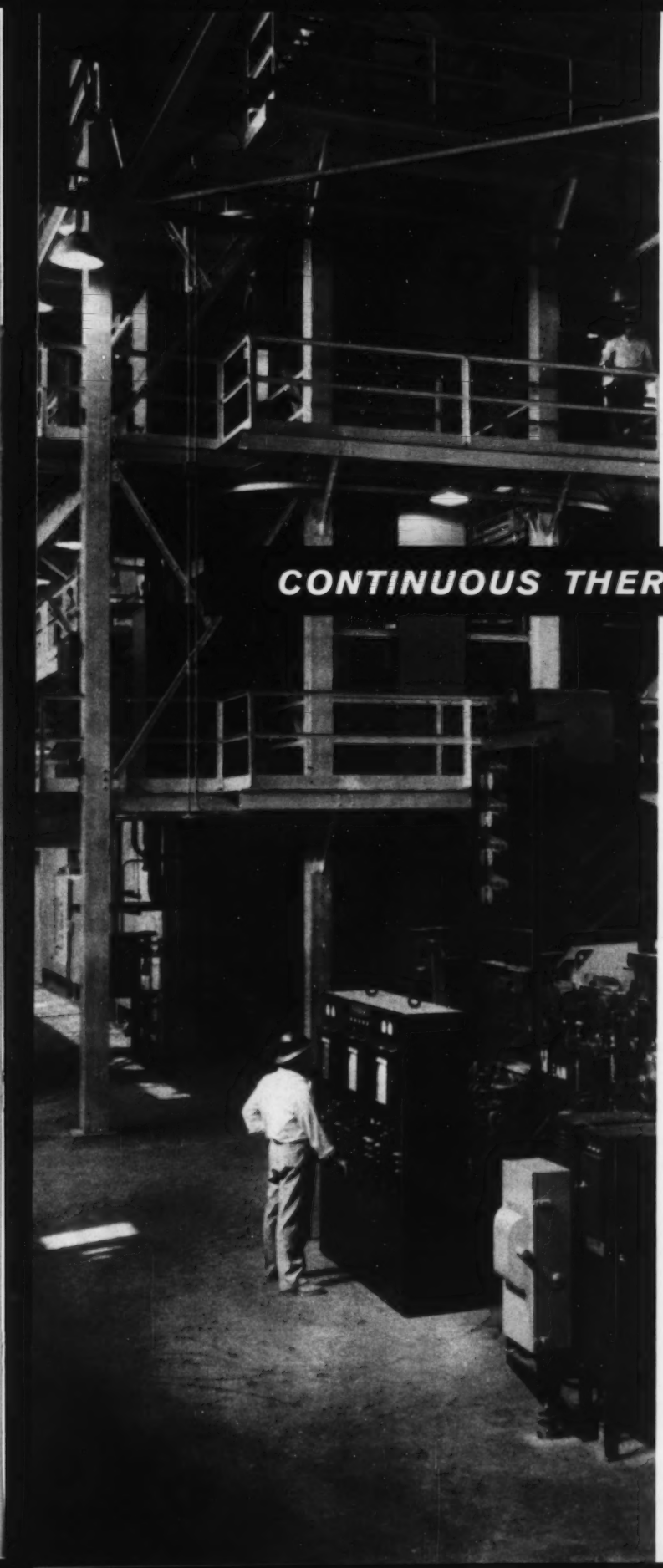
You can utilize these same facilities to speed production, increase quality and lower costs, because no one gives you more of all four factors; *price*, *service*, *quality* and *research* than American.

Decide for yourself. Send us your inquiry for price and delivery or your specifications for special fasteners. Write:

American!

SCREWSTICK being loaded into air-powered driver

AMERICAN SCREW COMPANY
Willimantic, Connecticut
Norristown, Pa. • Chicago, Ill.
Detroit, Michigan



CONTINUOUS THERMAL PROCESSING...

more steel... improved quality!

A significant first in the steel industry has resulted from the recent installation of three new and identical annealing lines, each designed to deliver 20 tons of improved-quality silicon steel per hour.

This continuous annealing operation in a limited area created an unusual problem in control accuracy and reliability. Westinghouse MAGAMP* magnetic amplifier regulators form the heart of the control system . . . make this the first all-magnetic amplifier continuous annealing line. Westinghouse furnished complete electric equipment and furnaces for all three lines.

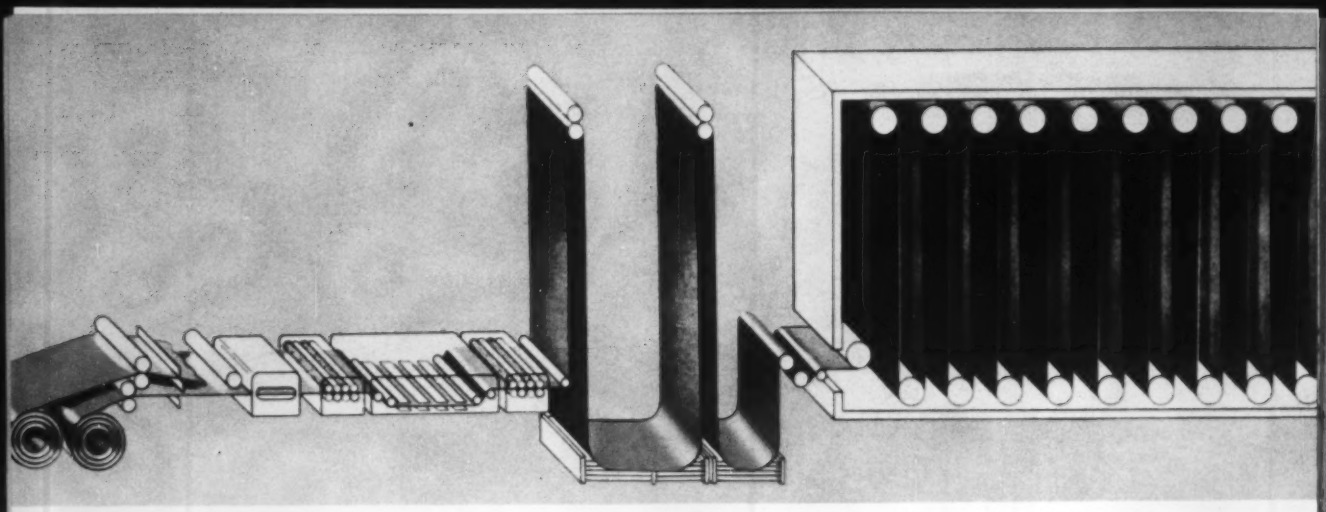
And . . .

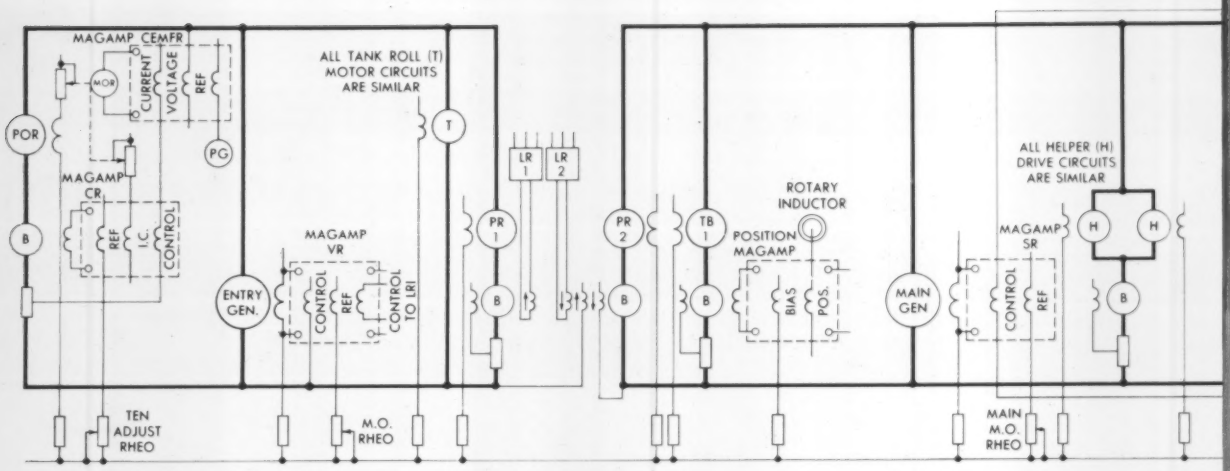
Here's another big development in the steel industry →

*Trade-Mark

YOU CAN BE SURE... IF IT'S

Westinghouse





Tin-plate annealing equipment designed for . . .

Process speeds beyond 2000 fpm, output 60 tons per hour!

Tin-plate annealing lines now being built will be capable of boosting output as much as 100% over existing continuous lines.

Continuous annealing lines are from 300 to 400 feet in floor length. Since the strip travels through many vertical passes, several thousand feet of tin plate are accommodated in the line between the pay-off and winding reels.

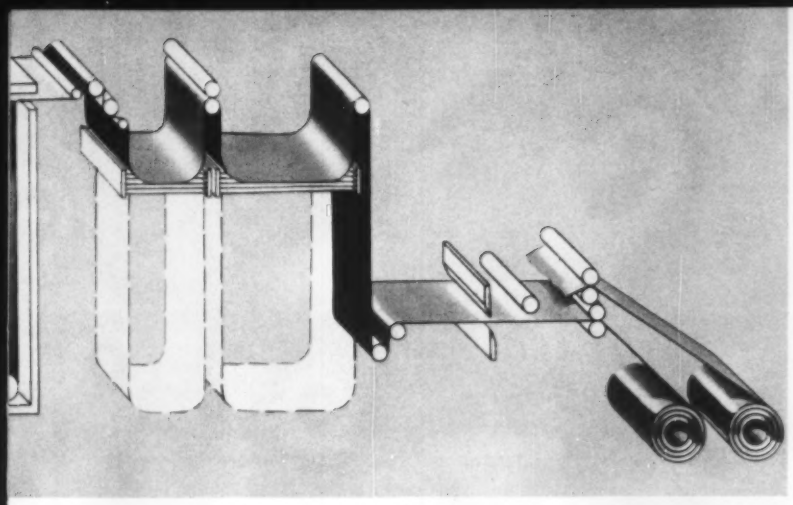
High-speed annealing operations like this demand the ultimate in coordination and reliability. Westinghouse motors, controls, furnaces and related equipment will help you handle speed and output up to and beyond 2000 fpm, 60 tons per hour—while maintaining precise quality standards. Moreover, Westinghouse accepts full unit responsibility for the electric and furnace equipment installed in your line.

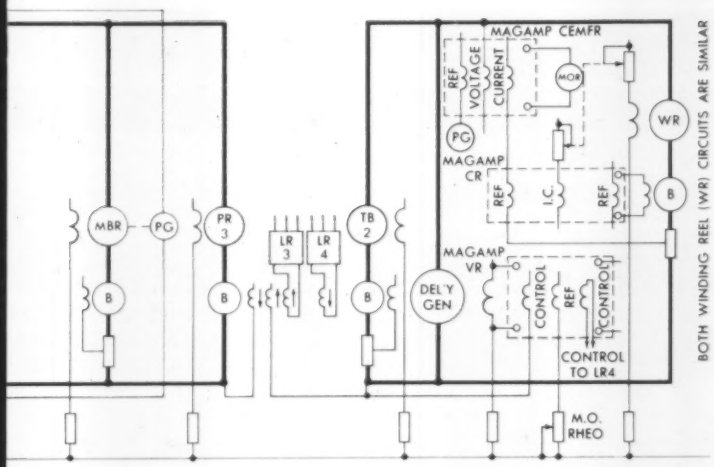
How Line Control Operates

Westinghouse has many years of successful experience applying MAGAMP regulators to drive systems. Above diagrams show how Westinghouse MAGAMP regulators are applied in modern, continuous annealing lines.

MAGAMP speed regulator (SR) maintains constant speed through the critical annealing zone. Speed reference, set by main motor-operated rheostat (MOR), is

YOU CAN BE SURE...IF IT'S Westinghouse





balanced by the control winding fed from the pilot generator (PG) driven by the master bridle roll (MBR).

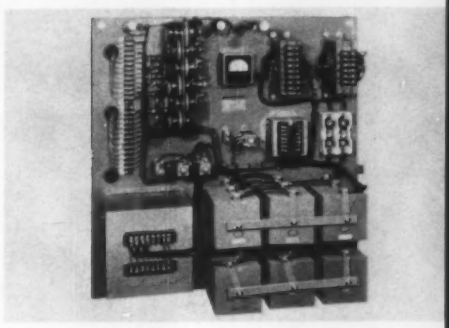
MAGAMP voltage regulators (VR) control the voltage of the entry and delivery generators assuring fast, even acceleration and deceleration and a minimum of loop disturbance during steady operation. Loop regulators set as verniers in controlling generator voltages.

MAGAMP current regulator (CR) for booster, and MAGAMP counter-EMF regulator (CEMFR) for motor, work together so regulated tension is maintained by the pay-off reels (POR) and winding reels (WR). Inertia compensation (IC), proportional to accelerating loads, and stall tension signals are introduced through the (CR) circuits.

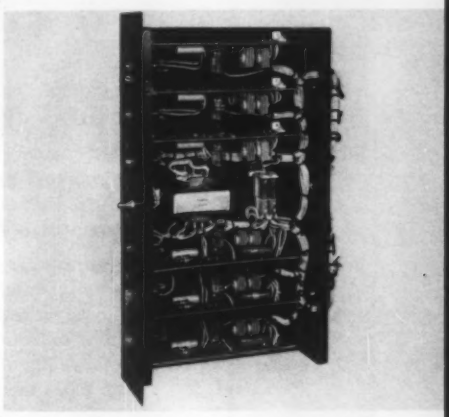
Photo-thyratron loop regulators (LR) provide modulated control of storage loops for smooth operation.

Machine characteristics are selected for best drive performance. Pinch roll no. 1 (PR-1), master bridle roll (MBR), and tension bridle no. 2 (TB-2), the pacesetters of their respective line sections, are shunt-wound for flat, speed-load characteristic. Helper drives (H) have high drooping characteristics which result in their developing only the power required to overcome their friction losses and inertia loads. Reel motors have high overload capacities suitable for accelerating the large coils which are now used in most mills.

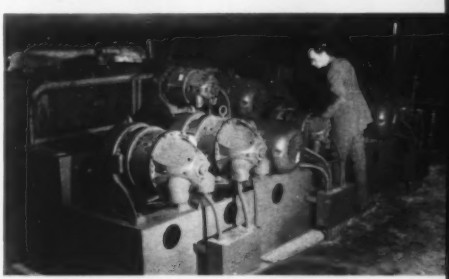
Centralized line control reduces space requirements and provides ready accessibility for inspection.



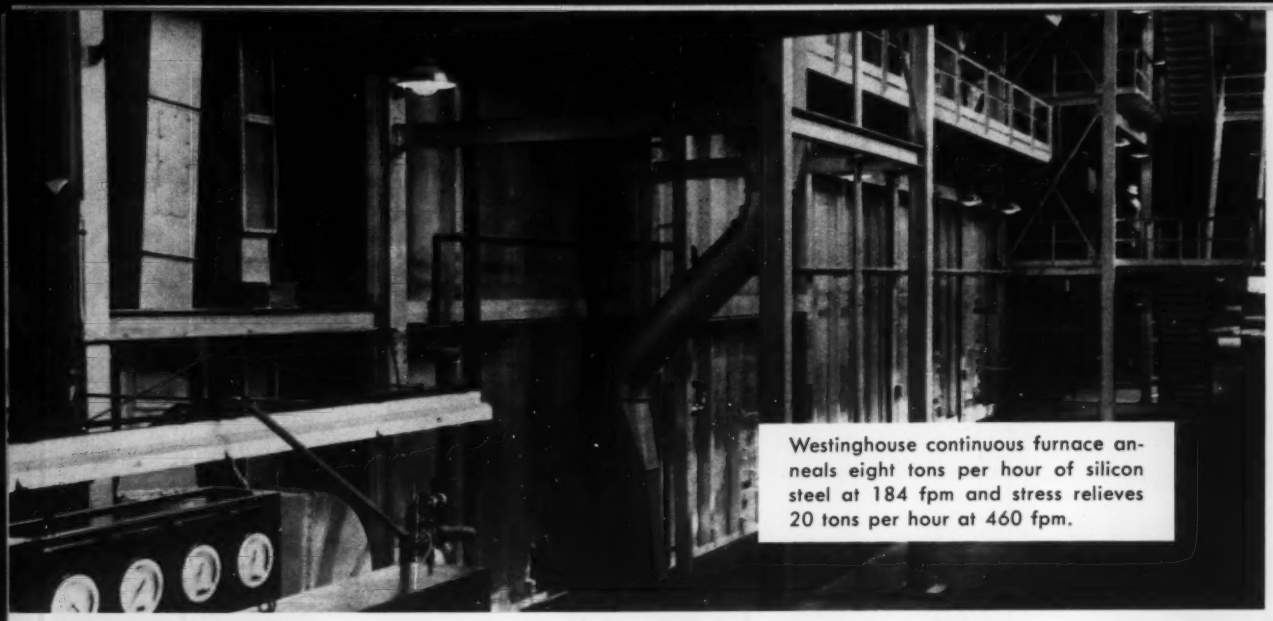
Magamps bring outstanding precision, dependability to line control . . . no moving parts, brushes, commutators, bearings.



New Westinghouse fault finder monitors control circuits simultaneously, indicates faults instantly and makes trouble-shooting easy.



Westinghouse d-c motors perform efficiently under tough conditions. High starting torque ideal for high inertia loads.



Westinghouse continuous furnace anneals eight tons per hour of silicon steel at 184 fpm and stress relieves 20 tons per hour at 460 fpm.

Three ways Westinghouse furnaces match increased annealing speed

Westinghouse gas and electric furnaces meet the demands of today's high-speed thermal processing and annealing lines three ways:

Construction—furnace layout compensates for thermal expansion. Maximum accessibility provided for convenient replacement of burner and heating element panels and rethreading.

Temperature Control—Typical examples are: proportioning-type controls to regulate recuperative radiant tubes in gas-fired furnaces; Furnatron® regulators to maintain constant temperatures in electric furnaces.

Atmosphere—Westinghouse atmosphere generators provide controlled and protective atmosphere which maintains product quality at higher speeds. Strip is produced flatter, more uniform . . . surface is cleaner.

Westinghouse consulting, application and design engineers can speed equipment installation, eliminate problems right from the start. They help match correct products to the job, test them to assure proper operation.

From planning or problem, to design, installation and start-up . . . Westinghouse is at your service. An experienced Westinghouse team will work with your engineering staff and consulting engineers in setting up your thermal process line.

For your convenience . . . 38 manufacturing and repair service plants superbly equipped for repairing all types of electric apparatus . . . 34 renewal parts warehouses strategically located in industrial centers, open 24 hours a day.

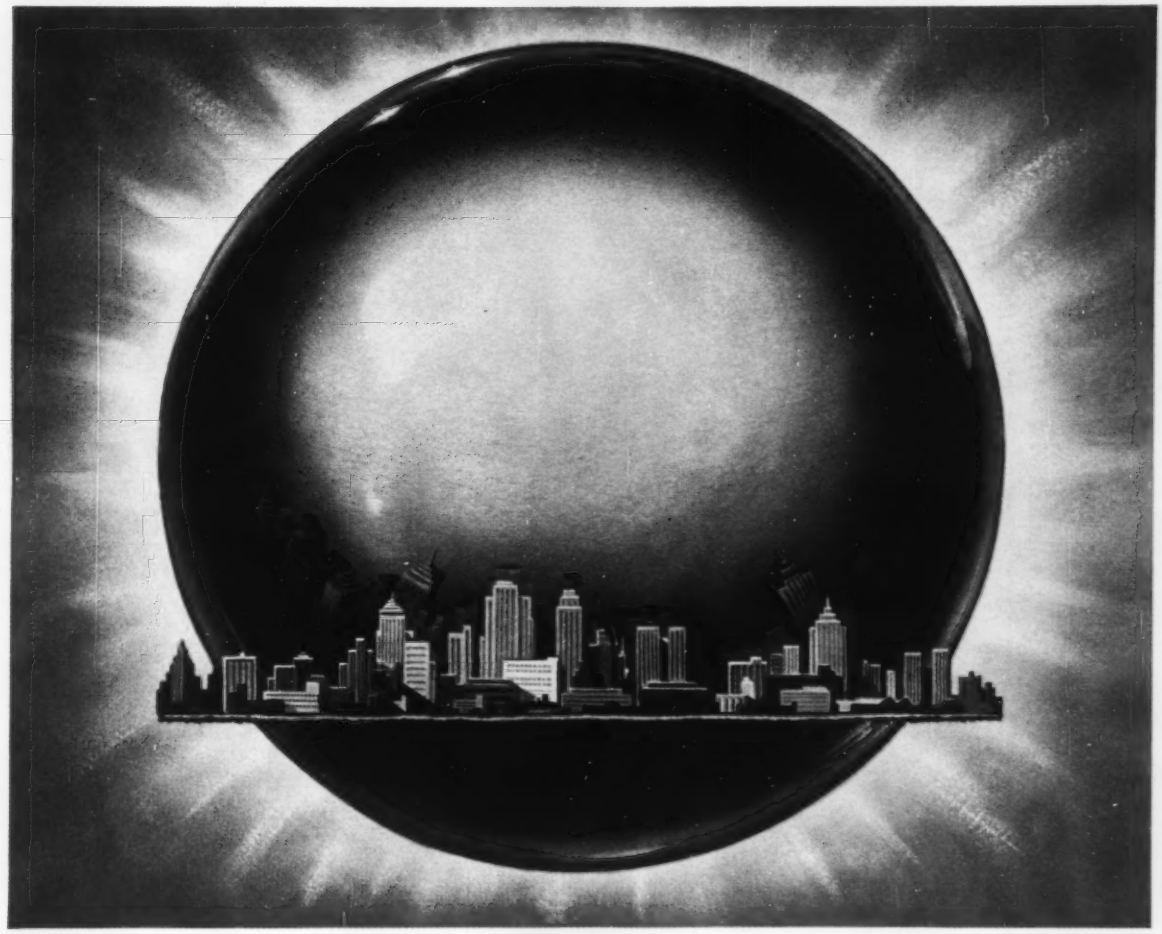
Contact your Westinghouse sales office for further details. Ask for a copy of B-6072, *Westinghouse Drives for Processing Lines.* Or write, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

MP-3044

Completely self-adjusting, magnetic, d-c motor brake assures safer, more positive stops and starts. Maintenance and replacements minimized.

Westinghouse engineers help you plan installations like this compact a-c control center for fans, pumps and other auxiliary equipment.

YOU CAN BE SURE...IF IT'S Westinghouse



Imagine a mile-wide ball with surface finish accurate to within 1/16"

If Hoover could make this giant bearing ball—one mile in diameter—and maintain Hoover quality of precision manufacture, the immense sphere would be so smooth that surface finish would be accurate to within 1/16 inch!

In actual terms, the surface smoothness of a Hoover Ball is measured on a micro-inch basis. Roundness and diameter are held within 25 millionths of an inch. Microscopic precision, both in smoothness and spherical accuracy, means quality in Hoover *Micro-Velvet* Lapped Balls.

Equipment which will measure surface quality to a fraction of one millionth of an inch is used to check and re-check Hoover Balls. A perfectly matched set of *Micro-Velvet* Balls goes in each bearing.

These precision-made balls team up with the ultra-smoothness and minutely exact curvature perfection of famous *Hoover Honed* Raceways.

The result . . . equalized load, high capacity, and quiet operation, assuring superior operating performance and long life.

Investigate Hoover's complete line of balls, made in many metals, as well as light, medium and heavy series ball bearings. Engineering assistance is readily available to manufacturers. Write for information.

hoover

BALL AND BEARING COMPANY, ANN ARBOR, MICHIGAN

Hoover Honed and *Micro-Velvet* are Hoover Trademarks.

HOOVER HINTS:

Factors Involved In Bearing Selection

Application is the key to bearing selection. The importance of a bearing's characteristics is relative to the job it must do. Usually one of the most important factors is the capacity or load-carrying ability. Also important in many applications is the type of loading—thrust, radial or combined . . . the amount of friction involved . . . the ease of assembling a bearing into a unit . . . the danger of misalignment . . . the limiting maximum speed.

All types of anti-friction bearings are concisely compared and analyzed from an engineer's standpoint in "Engineer's Handi-Book of Anti-Friction Bearings." Send for yours now.

Hoover Ball and Bearing Company,
Ann Arbor, Michigan.

Mail my copy of "Engineer's Handi-Book of Anti-Friction Bearings."

Name _____

Title _____

Company _____

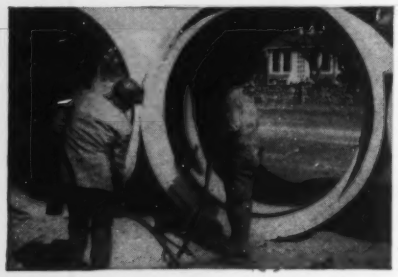
Address _____

City _____ State _____

9

(Advertisement)

Structural Steel of this new pickling shed is exposed to severe corrosive attack from sulfuric acid vapors. A three-coat system of Bitumastic® Super Service Black was selected to protect the steelwork after tests of various materials in a similar atmosphere. The first application of this cold-applied coal-tar protective coating was made before erection of the steelwork. Two additional coats followed after the steelwork was in place. The firm's own maintenance personnel applied the coating by brushing, one of the reasons that this easy-to-apply Bitumastic coating was selected. Expected life of the three-coat system is 5 years or more before touch-up.



Concrete Waste Lines in industrial and municipal treatment systems are attacked by the liquids handled. Bitumastic coal-tar based coatings give effective protection in this service. The 60-inch diameter pipe shown was lined with a Bitumastic coating before installation in 1949. At the same time, other concrete lines were installed without lining. A recent report indicates that the coated line is in excellent condition while the unprotected lines show signs of deterioration.

Sewage and Waste Treatment plant equipment is constantly exposed to the destructive effects of corrosion from the liquids and vapors handled. Engineers in industrial and municipal waste disposal work will find this new bulletin a valuable reference in the consideration and specification of protective coatings for this environment. Write for your copy today.

how to CUT CORROSION LOSSES

a report by Koppers Company, Inc.

W. F. Fair, Jr.
Corrosion Consultant

The two most recent reports in this monthly series have stressed the importance of good surface preparation and described methods used to clean metal surfaces prior to the application of protective coating systems. This report describes an experiment, conducted under service conditions, which illustrates striking differences in coating performance due solely to differences in surface preparation.

* * *

In 1952 speculation arose concerning the contribution of wash primer surface conditioners and of inhibitory pigmented primers, when used with coal tar coating systems. Dr. Joseph Bigos of the Steel Structures Painting Council, and editor of the Steel Structures Painting Manual, participated in the discussions, giving freely of his time and experience.

When it was decided to subject certain typical protective coating systems to an environment of known high corrosivity, two areas in the Koppers Coke Plant at Kearny, N. J., were selected. The location of this plant on tide water, fumes and "coke breeze" from adjacent ovens, saline condensation from the coke quenching, and seasonal temperature shocks assured rugged testing conditions.

The areas tested were an actifier tower and three oxide box tops, totaling nearly 5,000 sq. ft. of steel surface. Fourteen coating systems were applied in duplicate 2-foot-wide strips on the vertical actifier tower, after thorough sandblasting. Of the flat box top areas, half were cleaned by sandblasting and half by power wirebrushing, and the same fourteen coatings were applied on both of these differently cleaned areas.

Primers used were a conventional coal tar cutback, three wash primers, two epoxy red leads, two phenolics, four special proprietary formulations, and three experimental coal tar solutions. Barrier coats over primers were Bitumastic® No. 50, Bitumastic Super Service Black, and Bituplastic® No. 28. For comparison, unprimed sections received the same coatings. Bituplastic No. 28 was used to topcoat all areas.

* * *

At the end of only one year, all systems on the wire-brushed areas—both primed and unprimed—had blistered and soon showed universal disbonding. After two years, disbonding and undercutting on these areas had caused complete coating failure. Now, after more than three years, all the coating systems on the sandblasted areas—both primed and unprimed—are in perfect condition and show no signs of deterioration.

In such severe corrosion environments, it is obviously futile to consider any but the best surface preparation. Also, it must be concluded that priming cannot compensate for incomplete metal cleaning.

* * *

Our Technical Department makes semi-annual inspections of this continuing test. We'll be glad to notify you of these inspection tours if you would like to be present. Write Koppers Company, Inc., 1301 Koppers Building, Dept. 101B, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario and Edmonton, Alberta.

KOPPERS

BITUMASTIC
REG. U. S. PAT. OFF.
COATINGS AND ENAMELS

The very high strength of USS "T-1" Steel has helped Athey Products Corporation, Chicago, Illinois, to solve the problem of providing a high-volume trailer for hauling lightweight materials such as bauxite ore. This new rear-dump trailer is bigger than conventional units, yet...

WEIGHS 3½ TONS LESS

The very high yield strength of USS "T-1" Steel—90,000 psi minimum—enabled Athey to increase working stresses and reduce the thickness and weight of drawbar and draft frame structure and of all load-containing body plates. As a result, this unit weighs just 26,000 pounds—7,000 pounds less than conventional units—and, consequently, it . . .

TRAVELS FASTER

It can make empty trips much faster . . . can negotiate steep grades in one higher transmission speed than conventional units. Even with a full load of 35 tons, this lightweight unit can climb 14% grades in second gear. By reducing weight, USS "T-1" Steel speeds operations, cuts non-productive time, and makes possible a larger trailer that...

CARRIES MORE PAYLOAD

This trailer has the lowest ratio of vehicle weight to load weight ever designed . . . and carries a full 30.5 cu. yds.—8 yards more than conventional units of the same weight-carrying capacity. It promises to increase, materially, the efficiency of hauling *lightweight* materials . . .

THANKS TO USS "T-1" CONSTRUCTIONAL ALLOY STEEL

USS "T-1" Steel's toughness and resistance to impact abuse assure Athey the ruggedness and durability needed in off-road mountain service. Its excellent weldability kept fabrication simple.

USS "T-1" Steel can help you in a wide variety of heavy-duty applications. Get complete facts—call our nearest sales office, or write to: United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS

See The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your newspaper for time and station.

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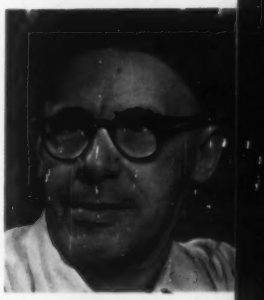
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

"It's a hydrogen-annealed with a 30-micro-inch finish,"

mass spectrometer magnet...

says **Albert J. Gross,** *U. S. Steel Machinist, Homestead Forgings Division*



We must admit that there was some doubt that these sections in the picture could ever be made to the specifications required by Argonne National Laboratory. They are yoke members and pole pieces for a 100-inch double-focus, mass spectrometer.

One of the primary requirements of the magnet was that it be made from as pure a steel as was commercially obtainable. Also, it had to be produced in one heat to minimize variation in behavior of the magnet.

The heat-treating problems were enormous and would have stumped any organization without the facilities and background of USSteel. The annealing, which was performed in a hydrogen atmosphere, developed a uniform, large grain structure for optimum magnetic characteristics. Unusual techniques were used, and a special steel jig was constructed so that the large pieces could be annealed without warpage.

Machining problems are best described by Al Gross who has worked as a USS Machinist for 34 years, 20 of them in the Forgings Division. In his words, "The specs for machining tolerances, surface finish and flatness were so exacting that at first there was doubt that it could be done. The wide plates, which are actually in three pieces, have a 50-micro-inch finish. The narrow pole pieces had to be parallel and flat within plus or minus .001″. The ends had to be within .002″ of a true square, and the surfaces were polished to a 30-micro-inch finish."

We don't receive orders for spectrometer parts very often. But even so, this job shows that a wide range of facilities are available when you specify a USS Quality Forging. From the melt shop, through the forging, heat-treating, machining and inspection departments, you can be sure of equipment of the best type, operated by men of the highest skill.

Please direct your inquiries for forgings to our nearest District Office and your request for our free 32-page booklet on forgings to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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heavy machinery parts . . carbon, alloy, stainless

forged steel rolls and back-up roll sleeves

electrical and water wheel shafts

specialty forgings of all types

USS

UNITED STATES STEEL

NOTHING *can equal Stainless Steel*

in its unique combination of properties

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength, hardness, beauty, cleanability and easy fabrication. For a reliable source of supply, United States Steel offers you the widest range of types, finishes and sizes.

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USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS

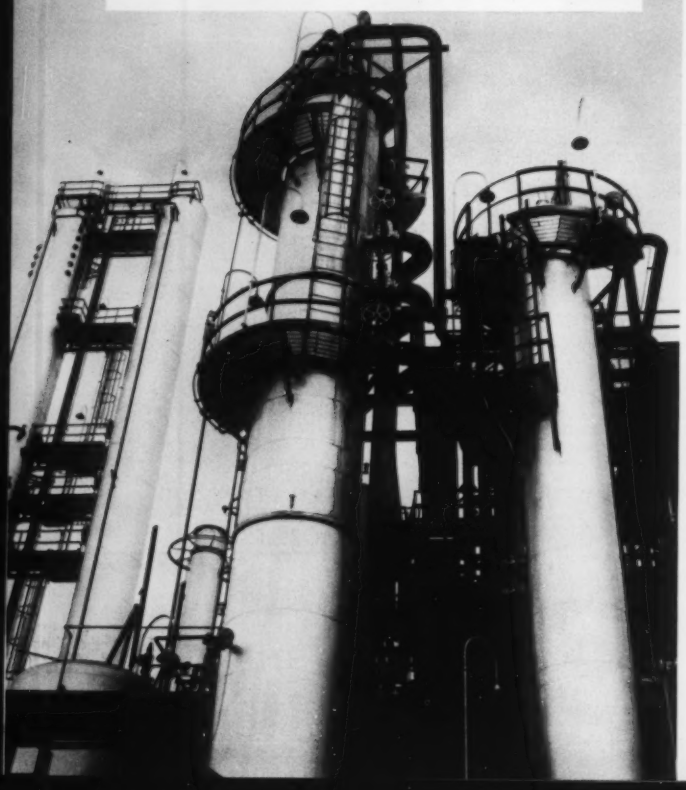
UNITED STATES STEEL

For Sanitation

Food juices are incredibly corrosive, so some restaurants have a lot of trouble in their cold storage rooms because the racks corrode and harbor bacteria. Eastern Steel Rack Company makes racks from Stainless Steel. They are easy to keep clean; and, for all practical purposes, they *never* wear out.

For Corrosion Resistance

This petrochemical extract fractionator was originally made from carbon steel . . . but corrosion ate through the plates and put it out of service in *just two months*. They lined the tower with type 316 Stainless Steel. When examined, the tower had been in service 21 months, and the Stainless was still in good condition.



For Cleanliness

Hawthorne Paper Company, Kalamazoo, Mich., goes to extraordinary lengths to guard against color contamination. Old wooden tanks were thrown out and replaced with Stainless Steel. According to the men at Hawthorne, the Stainless has absolutely no contaminating effect, and it's easy to fabricate.

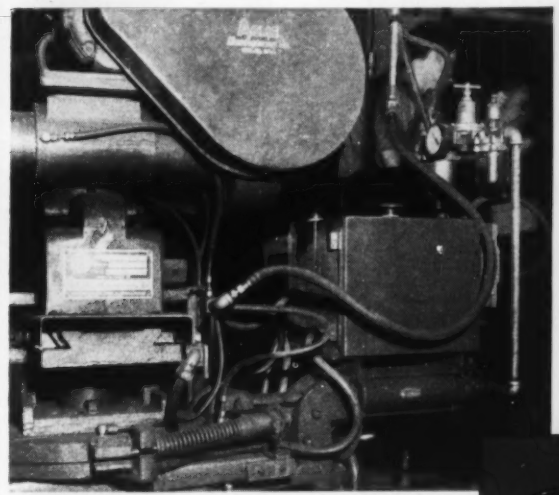
"We Use Aeroquip Flexible Hose Lines to Minimize Downtime for Repairs and Modification"

Reports Plant Maintenance Superintendent, THE HOOVER COMPANY

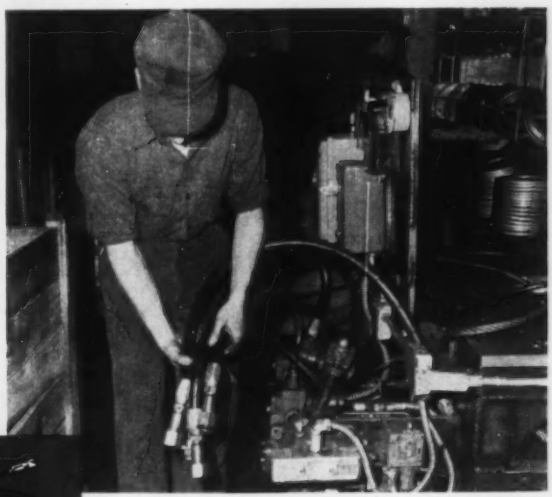
Typical of an efficient industrial plant using Aeroquip Hose Lines to best advantage is The Hoover Company, well known manufacturer of home appliances. The time saving benefits of Aeroquip are two-fold: (1) For quick maintenance, replacement hose lines are made by Hoover personnel as they are needed, from a simple inventory of Aeroquip Bulk Hose and Reusable Fittings; (2) Use of Aeroquip Flexible Hose Lines and Self-Sealing Couplings, which connect and disconnect with no loss of fluid, allow some machines to use larger dies and also speed interchange of attachments and complete machines. Production versatility has been increased in this way.

The Aeroquip Distributor listed in your Yellow Page Phone Book can pass many cost-cutting maintenance and production ideas on to you. Call him today.

On this diecasting machine, Aeroquip 1509 High Pressure Hydraulic Lines permit easy movement of the ram for repair or replacement of dies.



Aeroquip 1525 Low Pressure Hose Lines with *SOCKETLESS* Fittings supply an oil mist to this grinder. 1525 Hose can be pushed on the *SOCKETLESS* Fittings by hand.



Aeroquip Hose Lines and Self-Sealing Couplings permit quick interchange of various hydraulic piercing units on this bench, permanently set up on the production floor.

(*SOCKETLESS* is an Aeroquip Trademark.)

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

SOCKETLESS Fitting Patents: Great Britain 740,428; France 1,088,423; Austria 185,178—Patents pending in U.S.A., Canada, and other countries.

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

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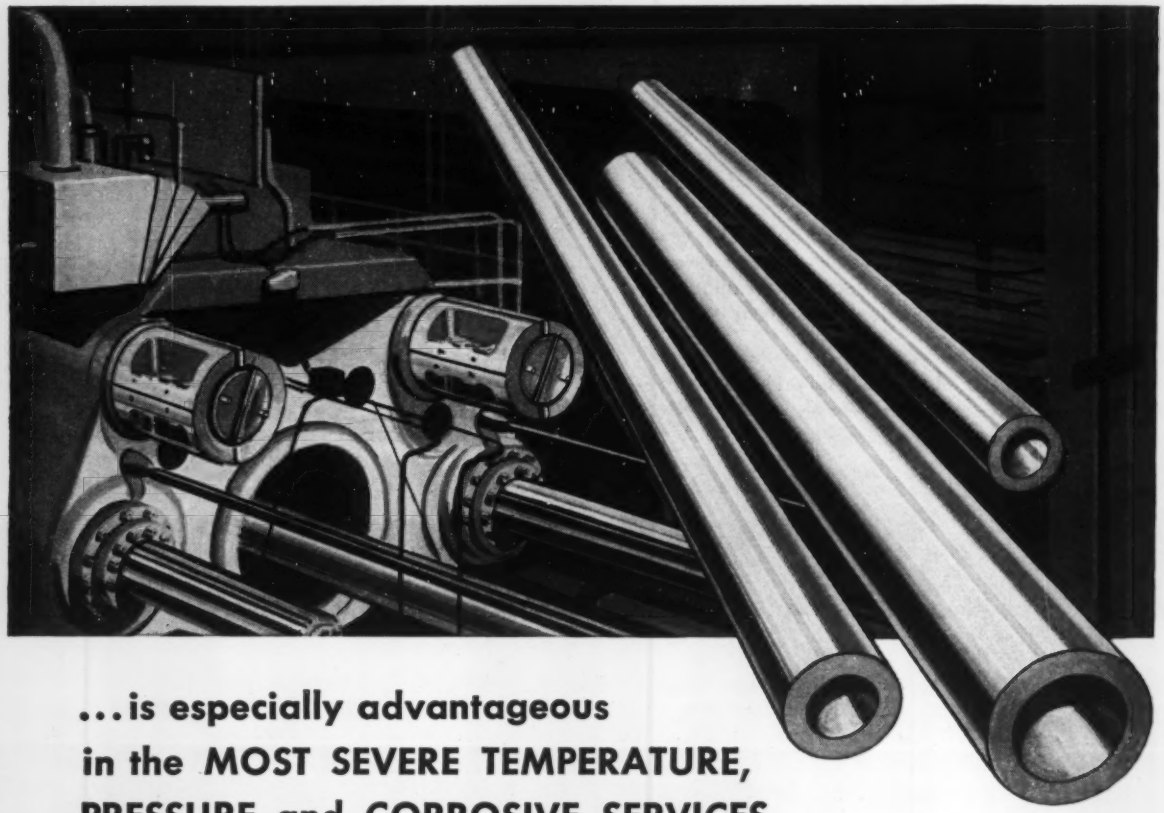
EXTRUDED ALLOY STEEL PIPE

available from 4" to 22"O.D. in practically any wall thickness



...is especially advantageous in the MOST SEVERE TEMPERATURE, PRESSURE and CORROSIVE SERVICES

A specially-built 12,000 ton extrusion press — capable of processing any of the stainless or other ferrous alloys — imparts vastly improved mechanical properties to new Curtiss-Wright ***HIGH INTEGRITY*** pipe. *High ductility with high strength* and *higher resistance to stress at high temperature* are automatically built into even the largest diameters and thickest-wall products. In the larger diameters, 10" and above, the economics of ***HIGH INTEGRITY*** pipe are particularly attractive.

Major economies are regularly effected in fabrication and installation . . . using the longer units — up to 50 feet. Ultrasonic testing of all ***HIGH INTEGRITY*** pipe — combined with the more conventional test methods — assures uniform, dependable, specification quality of delivered product.

Curtiss-Wright's Metals Processing Division maintains qualified engineering personnel at all branch offices, available for design consultation and specification pricing.

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How can you bear being up a tree?

If grinding wheel problems have you in a bearish mood—or even out on a limb—stop growling. Switch to CINCINNATI (PD)° WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that can *save you money* . . . and *increase your production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So, if you want the bare, down-to-earth facts on how to save money and increase production, contact your CINCINNATI Grinding Wheels distributor. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

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CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

Rust-Oleum is distinctive as your own fingerprint. Accept no substitute.

. . . goes on faster, stops rust, lasts longer over rust!

ONE MAN often does the work of two!

EASIER TO USE—because Rust-Oleum 769 Damp-Proof Red Primer goes over rusted metal after scraping and wirebrushing to remove rust scale and loose rust—usually eliminating costly surface preparations. *Stops Rust*—because Rust-Oleum's specially-processed fish oil vehicle *penetrates* rust to bare metal—driving out air and moisture that cause rust.

LASTS LONGER applied over rust—and teamed up with Rust-Oleum's many attractive finish coatings, assures lasting beauty. Try Rust-Oleum on *your* tanks, metal sash, machinery, wire fences, stacks, girders—or around *your* home. Prompt delivery from Industrial Distributor stocks. Write for illustrated literature with color charts showing colors and applications.

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30% GREATER COVERAGE—MANY ATTRACTIVE COLORS

Rust-Oleum covers up to 30% more area, depending upon surface condition and porosity. And you can beautify as you protect with Rust-Oleum finish coatings in Aluminum, White, Red, Gray, Green, Blue, Yellow, Black, etc.

STOPS RUST!®

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Write for special report showing Rust-Oleum penetration to bare metal.

AN EXAMPLE OF ALCHEMY

Transmutation of machine chips (background to foreground) from base steel to pure profit

The chips in the foreground aren't really gold – but they are the next best thing if you do extensive machining on circular forgings. They're Hi-Qua-Led Steel*. They are also the same grade steel as the chips in the background – 4140. You can see the great difference, but let us tell you something about it, too.

An initial production run in a customer's plant – using a Fellows gear shaper – produced both sets of chips. The regular 4140 steel forging had a Bhn of 285; the 41L40 Hi-Qua-Led Steel forging in the same grade had a Bhn of 285 to 293. Here are the results:

	4140 Steel	41L40 Hi-Qua-Led Steel
Roughing cut	50-60 sfm 0.0145 feed 0.530 depth of cut	80-85 sfm 0.0176 feed 0.533-0.538 depth of cut
Finish cut	50-60 sfm 0.0145 feed 0.033 depth of cut	100 sfm 0.0176 feed 0.025-0.030 depth of cut
State of finish	regular	super-finished
Total machining time	3½ hr average per gear (excluding down time for tool breakage)	2 hr average per gear (no tool breakage)

Machining time saved: 1½ hours or 43 per cent per gear. The savings shown in this particular test are typical of Hi-Qua-Led's performance in many applications. Further, when you use Hi-Qua-Led circular forgings you do not sacrifice any regular steel quality. Hi-Qua-Led in any AISI grade has the same attributes as regular steel of the same grade.

Investigate the possibilities of Hi-Qua-Led Steel in circular forgings from 18- to 145-in. OD. ALCO specialists will visit your plant to help you save the most from its machining potentials. Contact your nearest ALCO sales office, or write Spring & Forge Division, Dept. OCF-3, P. O. Box 1065, Schenectady 1, N. Y. for brochures.

Trade-mark registration pending. Patent applied for on lead-addition method.

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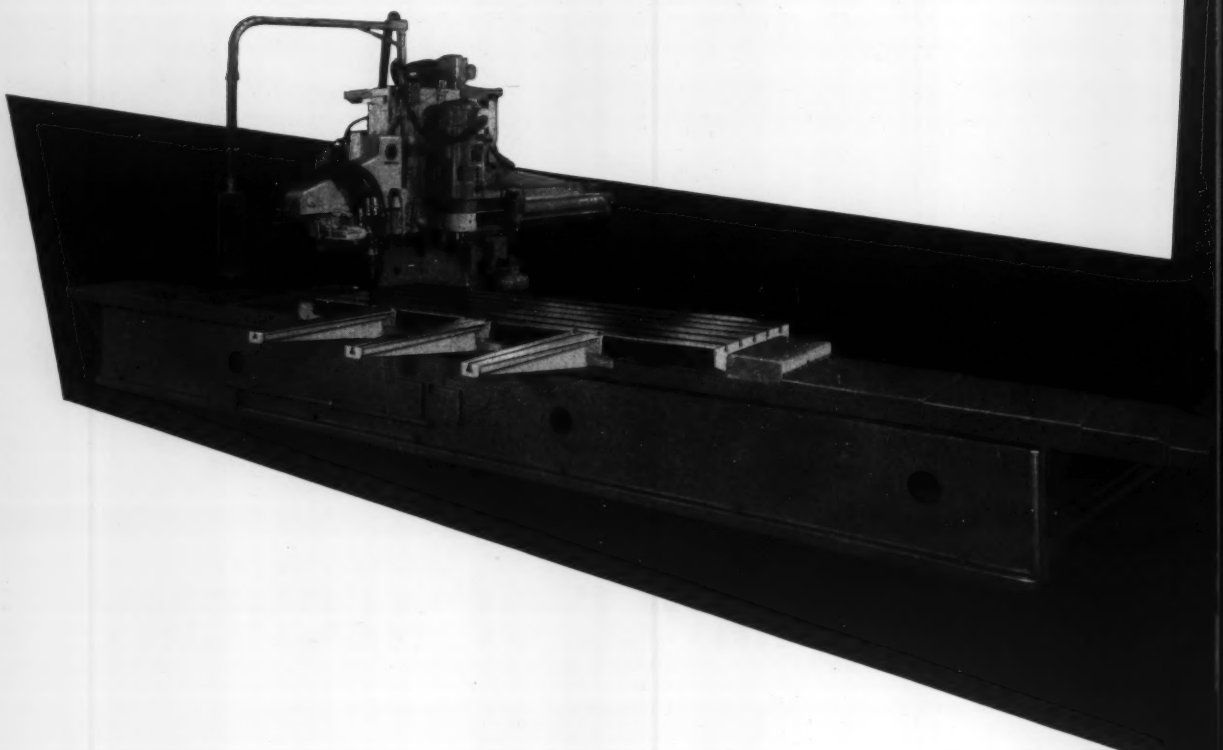
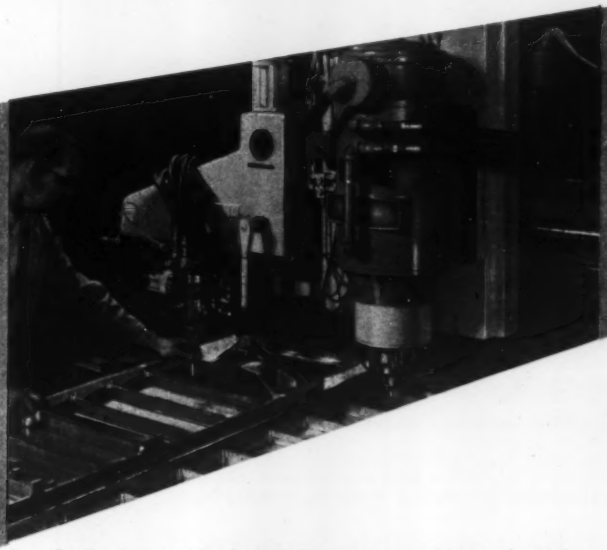
new hydraulic planer-type **air-frame mill**



for fast, high-precision machining of aluminum air-frame parts



Specifically designed for fast, high-precision machining of variable and complex, 3-dimensional shapes, this new air-frame mill speeds the machining of aluminum air-frame parts. Equipped with a highly sensitive, 3-dimensional hydraulic tracer valve for contour work, the machine also has a depth control valve for 360° tracing. Machining is traced from wood, plastic, metal, plaster of paris models, or actual parts. Available in sizes to 36″ x 36″ x 10 feet.

Features

30 HP Hydraulic
Counterbalanced Head
Controlled Pressure Lubrication
4-Position Depth Control Turret
Interlocks "To Fail Safe"
Swiveling Pendant
Panel Mounted Valves

Accessories

Telescoping Way Guards
Template-Support Brackets
Spray Coolant for Milling Cutter

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"Your company will go all-out to give the best possible service"

These are the words of Fred O. Reedy, president of Kennedy-Van Saun Mfg. & Engineering Corporation, Danville, Pa. He was writing about two seamless steel rings his company required to complete a huge rotary cooler.

The larger of the two rings called for an outside diameter of 109½ in.; the other for one only slightly smaller. We forged them of special-analysis steel made in our own plant, rolled them to shape, quenched and tempered them for the right hardness and other physical characteristics—then finish-machined them to close tolerances—*and got them to our customer on time.*

The compliments from Mr. Reedy are among hundreds along the same lines in our files. We can be proud of the products we manufacture and the good service we provide—service we believe not many mills can match.

Write Dept. 2B today for the story on special-order rings, flanges and open-die forgings by Standard Steel.

"When our Purchasing Department explained the importance of this emergency job and stated how badly we needed these forged steel rings, you agreed to supplythem in 2 weeks' time and your shipment was right on schedule."

Standard Steel Works Division

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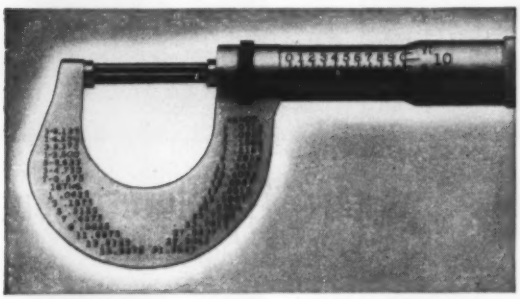
BALDWIN BLH LIMA-HAMILTON

*consistent quality

is as important in the pin as in the gear

To function effectively, a spring pin must drive easily into holes drilled to normal production tolerances, compressing as driven. To drive easily, hold firmly and fit flush, the pin —*every* pin—must meet the strict requirements of specifications such as those prepared by the SAE and the Military Services.



Since failure of a pin can be as costly as a failure of any other precision part, it is important to check the pins *you* buy for uniformity . . . uniformity of diameter and length, shear strength, hardness, insertion and removal forces, and recovery of diameter.

Rollpin has been tested many times—by many manufacturers—with a consistently high performance record. It has been widely recognized as the "quality" fastener of its type. In this case, quality can be—and should be—measured. We strongly urge that you test for quality when buying spring pins.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R28-260, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

☐ Rollpin samples
☐ Rollpin bulletin
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

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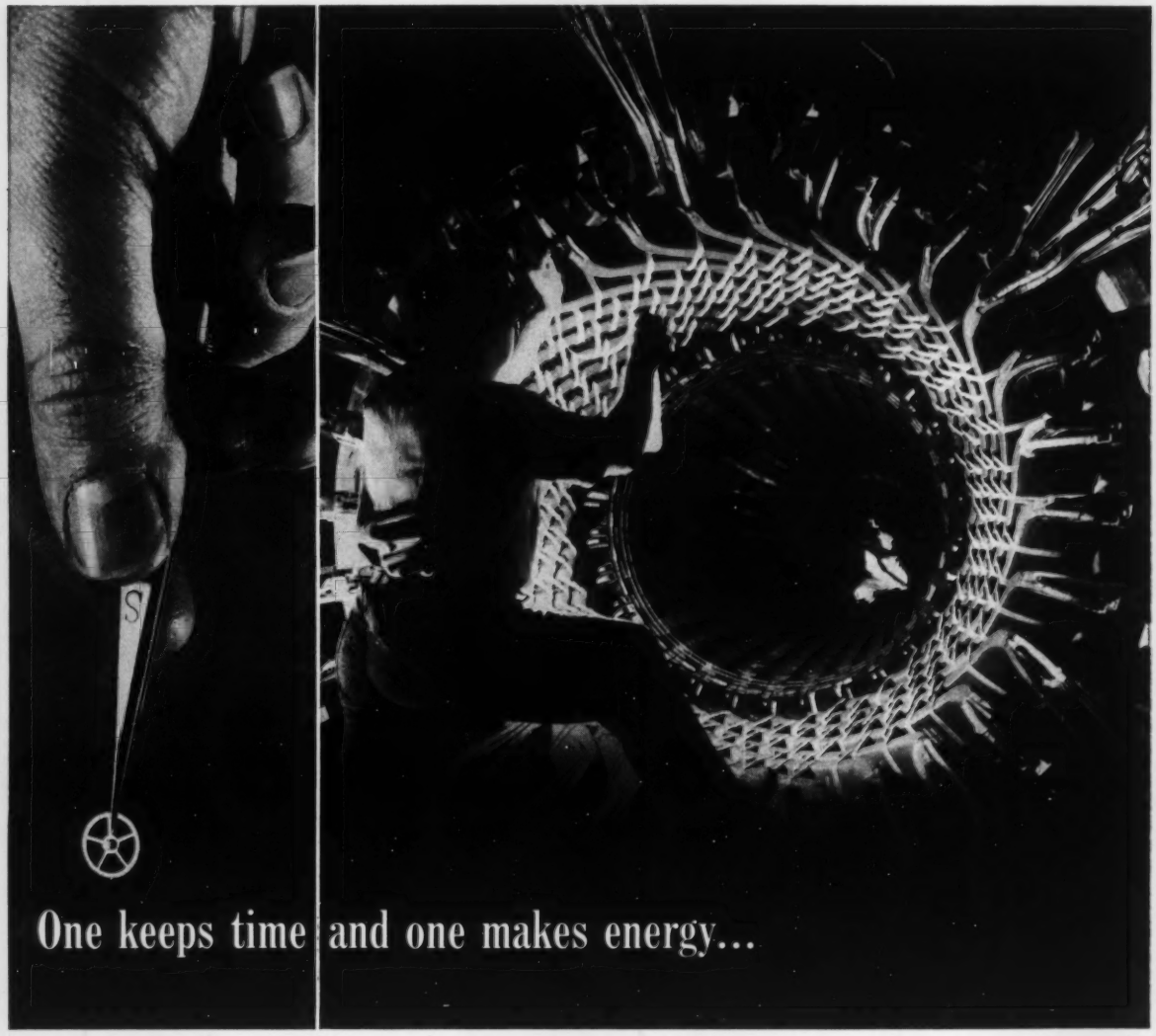
City_____ Zone____ State_____



both are vapor degreased in Columbia-Southern Trichlorethylene

Vapor degreasing has proved an ideal process for fast, efficient and economical cleaning of metal parts ranging in weight from fractions of an ounce up to thousands of pounds. The massive, 268 ton generator stator (right, above) can be degreased as thoroughly as the 1/240 oz. watch gear. It's been done. Like putting a diamond and the Rock of Gibraltar in the same bathtub, you say? In a way, it is . . . with the "water" just right for both.

Columbia-Southern's *neutrally stabilized* Trichlorethylene is rapidly becoming the preferred vapor degreasing solvent. In vapor or liquid form, it leaves the widest possible range of metals dry and free of contaminants. In seconds, parts are ready for immediate fabrication, painting, and in most instances, plating.

Made to extremely rigid standards of controlled quality by the world's leading merchant producer of chlorine, Columbia-Southern Trichlorethylene is non-flammable for greatest safety in use. Its high vapor density and low boiling point keep vapor losses very low . . . a crucial consideration when you're selecting solvents. And Columbia-Southern Trichlorethylene is set apart from others by its exclusive neutral type of built-in stabilization. This superior solvent is not formulated around highly alkaline amines that merely attempt to neutralize acid breakdown products. Rather, the neutral stabilizer "locks" the solvent against decomposition under light, heat, oxygen, acids, moisture, and repeated distillations.

Columbia-Southern Trichlorethylene is available in tank cars, tank trucks, and drums. For further information, write today to your nearest Columbia-Southern sales office or to your solvents distributor.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

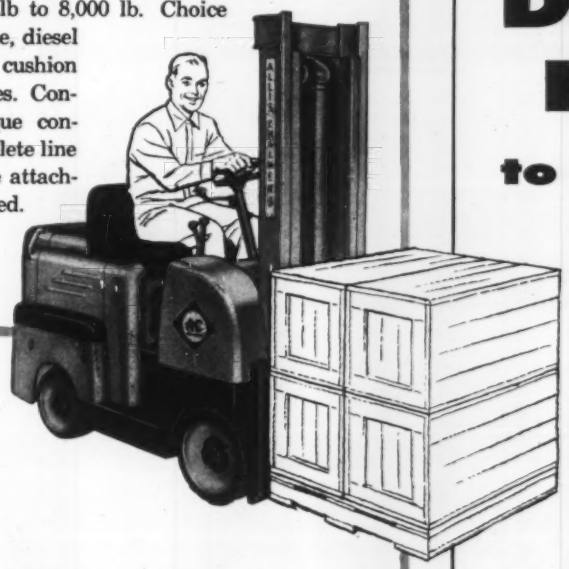
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Cincinnati • Charlotte Chicago • Cleveland • Boston • New York • St. Louis • Minneapolis • New Orleans • Philadelphia • Houston Pittsburgh • Dallas • San Francisco

IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

HERE'S Diversified Handling to meet your needs

Fork Trucks — Over half a hundred models and sizes with outstanding operating and service advantages. Capacities range from 2,000 lb to 8,000 lb. Choice of fuels — gasoline, diesel or LP gas. Solid, cushion and pneumatic tires. Conventional or torque converter drive. Complete line of interchangeable attachments to fit the need.

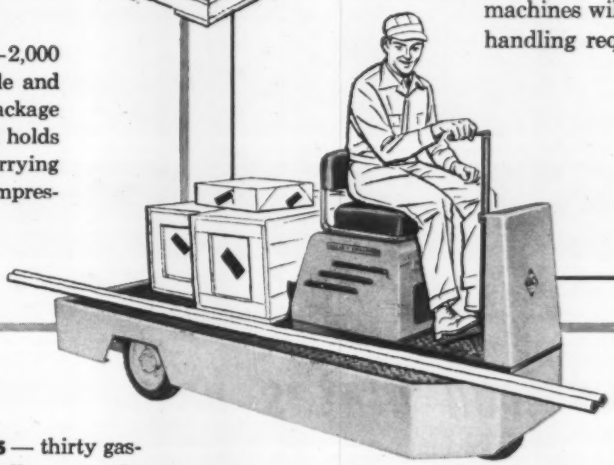


Whether you want to lift material, carry it or pull it, here is Allis-Chalmers equipment to do the job with real savings in time and money. Each unit is suited to a specific type of handling. Each is built "from the drawing board up" to deliver top performance.

Ask your Allis-Chalmers Material Handling Dealer to show you how these machines will fit your particular handling requirements.

CHORE BOY Platform Trucks — 2,000 and 3,500-lb capacities. Ideal for shuttle and inter-department delivery, pickup and package distribution, other handling. Large deck holds a variety of material. Is suitable for carrying personnel or for mounting welder, air compressor, other equipment.

CHORE BOY is an Allis-Chalmers trademark.



SHOP MULE Industrial Tractors — thirty gasoline and diesel models with drawbar pulls up to 12,000 lb. Compact, highly maneuverable, these tractors are designed for towing or pushing wheeled vehicles, moving heavy machinery — are also used for maintenance work and operating auxiliary equipment.

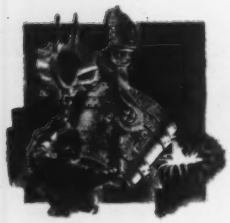
See these examples of *Allis-Chalmers Engineering in Action* . . . in action against handling and maintenance costs.

MATERIAL HANDLING DEPARTMENT
BUDA DIVISION, MILWAUKEE 1, WISCONSIN

BH-30

AC ALLIS-CHALMERS

ALLIS-CHALMERS



AMERICAN ORIGINALS IN IRON AND STEEL

How iron plates helped win the West

In the early 1800's, when Lewis and Clark made their historic pioneering trip across the continent, their supplies were limited to bare necessities. Strangely, however, among these necessities were a number of *small iron plates.*

The Indians of the Northwest valued these plates very highly. They would trade approximately a bushel of grain for a piece of iron only 4 inches square. This metal enabled them to make better axes, implements, and weapons . . . to be suddenly transferred from the Stone Age to the Iron Age. Thus *iron* became a means of gaining the Indian's friendship, while indirectly helping to sustain the white man on his first coast-to-coast expedition.

The growth of our iron and steel industry, like the development of our country, also depended on the ingenuity of many men and the perfecting of many products. Among these products was Baker's MAGDOLITE, which today helps produce more uniform ingots . . . at lower refractory cost. It has proved superior in composition, preparation, strength, economy, and quality. Make a note of MAGDOLITE now . . . a name it will pay you to remember.

ANOTHER AMERICAN ORIGINAL

JEBCO
PRODUCTS
SINCE 1889

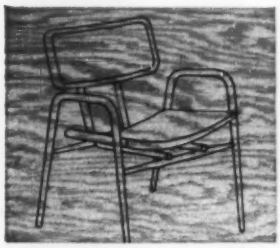
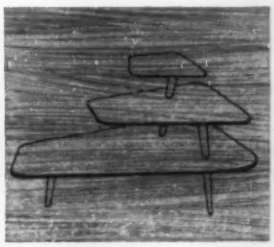
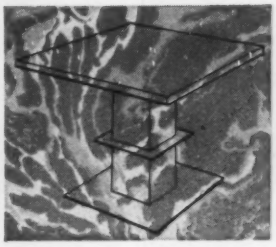
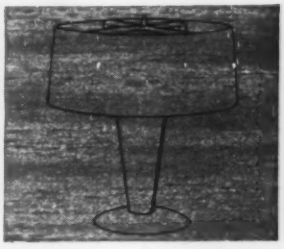
BAKER'S MAGDOLITE
The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

RIGIDIZED TUBING BY STANDARD

customized for you in "1001" patterns

For volume users of tubing—

Hundreds of exciting new patterns in rigidized tubing can be made up to add novel beauty, strength and individuality to your products. Textures and motifs to match fabrics, woods, materials and finishes of all kinds. In round, square, rectangular or special shaped tubing. And manufacturer sharing the cost of design development depending, of course, on volume of order. Custom patterns such as—nubby weaves, rustics, striateds, knotty pine, corrugated, herring-bone, ripple wood, swirls, scrolls, geometrics—can be designed to your specifications. Gleaming chrome or duo-tone enamel finishes. Unlimited pattern designs! Unlimited uses! You are limited only by your own imagination. Sizes range from ½" to 5½" OD in 16 gauge and lighter carbon steel tubing . . . and to 4" OD stainless steel.

Standard also offers full line of carbon and stainless tubing and pipe—for everything from simple *structural* to precision *mechanical* and *pressure* applications.

FREE 8-page folder on all Standard products. Write to address below.

STANDARD

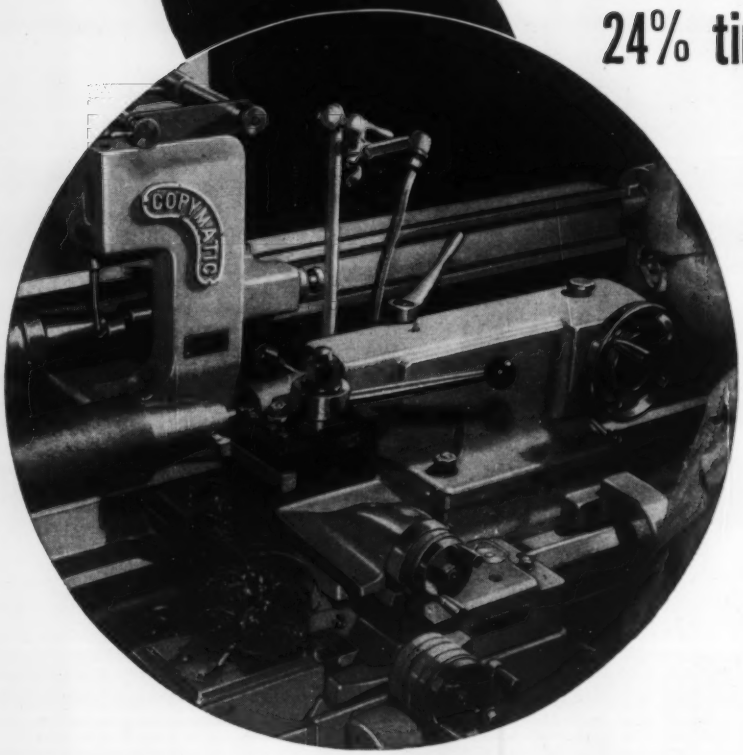
THE STANDARD TUBE COMPANY

24400 PLYMOUTH ROAD • DETROIT 39, MICHIGAN

Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and Heat Exchanger • Exclusive rigidized patterns • Special Shapes • Steel Tubing—Sizes: ½" OD to 5½" OD —.028 to .260 wall • Stainless—Sizes: ¼" OD to 4" OD—.020 to .154 wall.

straight from the horse's mouth:

..."a very good machine... 24% time saved!"



When a famous machine tool manufacturer reports on the performance of another's product, it is an opinion you can count on as authoritative.

The Ingersoll Milling Machine Company of Rockford, Illinois is one of the early owners of a new Lodge & Shipley 16" POWERTURN 90° COPYMATIC Lathe. Used in turning cutter housings and shanks, shafts and spindles, the lathe has proved very good, judged on performance, construction, accuracy and versatility.

If you want eye-witness proof of similar significant savings on *your* lathe production, the Lodge & Shipley Demonstration Room is at your service. Contact your Lodge & Shipley distributor for details or write direct to: The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

JOB FACTS

WORKPIECE: 4" Diameter Cutter Housing
OPERATION: Turn complete including taper
MATERIAL: 4140 HR Steel
CUTTING TOOLS: Carbide
FEED: .018" per rev.
SPEED: 431 RPM
TIME: Floor-to-Floor: approx. 35 min.
RESULTS: 24% time saved

Lodge & Shipley

"With Weirkote® you can forget plating or dipping after fabrication. It just won't peel or flake!"

Q.—Weirkote—is that a new kind of steel?

A.—*"New" only to those who don't know of its advantages. It's a zinc-coated steel with a skin-tight surface, produced by a continuous galvanizing process instead of the old pot-dip method.*

Q.—Well, we've tried galvanized before for the parts and products we make. But it just couldn't stand up under the punishment of fabrication.

A.—*Must have been the old type galvanized. When you use Weirkote for fabrication, you'll find its surface stands up under the severest stresses. Punch it, lock it, crimp it, deep-draw it—its zinc coating stays intact. It's got a* built-in *resistance to peeling and flaking.*

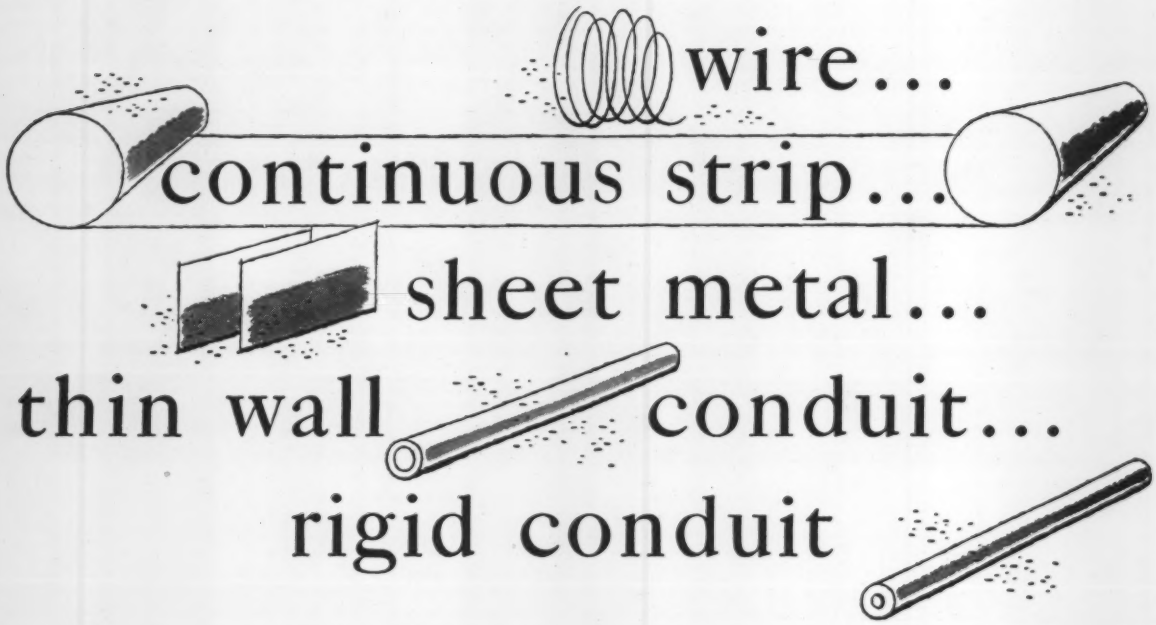
Q.—Well, say—that'd save all the cost of plating or dipping after fabrication, wouldn't it?

A.—*Exactly! Plus assuring you a* uniform *protective coating at all times—something even a special coating doesn't always provide on the more intricately fabricated parts.*

Send today for free booklet that details the time- and cost-saving advantages of using skin-tight zinc-coated Weirkote. Write Weirton Steel Company, Dept. B-1, Weirton, West Virginia.

WEIRTON STEEL COMPANY
WEIRTON, WEST VIRGINIA
a division of
NATIONAL STEEL CORPORATION

IF YOU PROCESS...



YOU CAN *Automate* ALL THESE OPERATIONS:

- cleaning
- phosphating
- pickling
- scrubbing
- plating
- paint prep
- electrogalvanizing

For Faster, Better Production . . . At Far Less Cost with an H-VW-M CONTINUOUS LINE SYSTEM

WRITE today, at no obligation, for the facts about an H-VW-M System that can bring cost-saving *automation* to your continuous line finishing—a system that can be integrated with your shearing, forming, slitting or annealing operations.

Hanson-Van Winkle-Munning Company, Matawan, New Jersey
Offices in principal cities.

H-VW-M

Industry's Workshop for the Finest in Plating, Anodizing, and Polishing Processes • Equipment • Supplies

PLATEMANSHIP —Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

NEW STAINLESS BAR MILL

Gives Greater Product Range

to *Rotary* Customers

Rotary's New Bar Mill

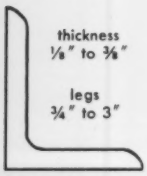
The two roughing stands have tilt tables on the delivery side with adjustable manipulators, and on the opposite side, drag chains to bring the bars into position.

Flexibility is the Keynote of Rotary's Stainless Bar Mill

Small lot production with excellent quality control, in a variety of products, can be accomplished with Rotary's new facilities.

Stainless bar and wire products are produced with specialized equipment. Rotary with its new mill can now supply a variety of products required by its stainless customers.

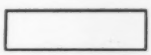
The new mill will roll the following sections:



ANGLES

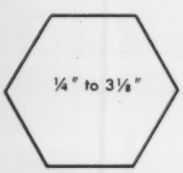
¼" to $^{25}/_{32}$"

COILS

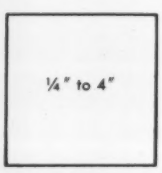


FLATS

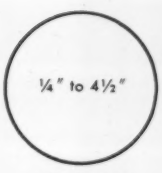
⅛" x 1¼" minimum to 1½" x 6" maximum or equivalent cross sectional area.



HEXAGONS



SQUARES



ROUNDS

Quality is maintained on this new bar mill by using batch-type furnaces for billet heating. These furnaces are of the double chamber type that permit control of the atmosphere and temperature cycles needed for the individual grades.

Batch-type furnaces with individual chamber controls permit use of the correct temperature and cycle for each grade.

Action view of repeaters on 12″ and 10″ cross country stands. Speed control is from operator's pulpit.

Rotary's New Mill is Different

- Every step of the process at Rotary—from billet heating to cutoff, cooling or coiling is completely modern.
- Quick changeover of the mill can be made whenever necessary.
- Practically all manual lifting has been eliminated by installing the latest mechanical handling equipment.
- Stainless rod is rolled continuously on the mechanized 6-stand rod mill. Intermediate bar sizes are rolled on the 10″ and 12″ mills using mechanical repeaters, whereas sections and large rounds are rolled by hand.

Rotary now has two complete bar mills. One is a completely mechanized mill for the rolling of stainless and alloy. The other, a combination mechanical and hand mill for the rolling of stainless bars, rod and sections in a wide variety of grades.

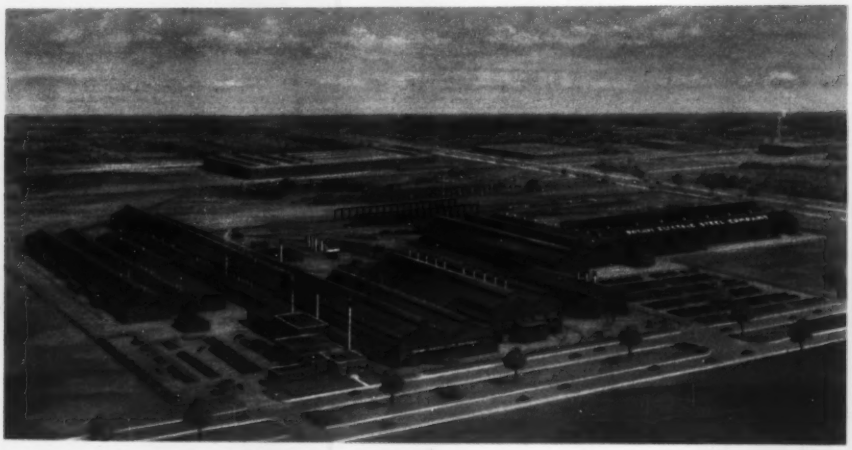
The two mills permit scheduling of orders to meet customers' delivery requirements.

Coilers to handle stainless rod from ¼″ up to and including $2\frac{5}{32}$″ diameter.

Rotary's Modern Storage Facilities Insure Prompt Delivery of Quality Stainless Bars

In Rotary's Stainless Building, above, hundreds of tons of stainless steel bars are finish-ground and placed in inventory to permit the prompt servicing of inquiries and shipment of orders. The photograph below shows Rotary's modern plant. It is on 41 acres of land on the northeast boundary of Detroit.

This 4-color brochure tells the complete story "How Steel is Made at Rotary." Send for your copy today.



Rotary Electric Steel Co.

Box 4606 • Detroit 34, Michigan

SALES OFFICES—Chicago, Ill. • Cleveland, Ohio • Newark, N.J.

SALES AGENTS—Indianapolis, Ind. • Fayetteville, N.Y.

"Warco PRESSES ...Stand up!"

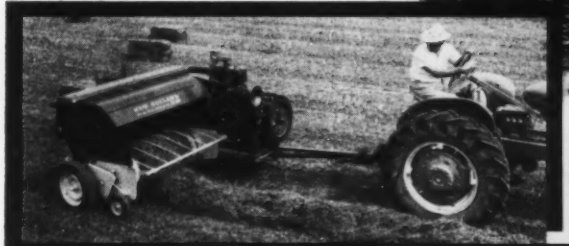
Tongue support part for New Holland baler, prepared with 75-ton Warco inclinable punch press, is shown fitted in place on Hayliner 68 assembly line at New Holland, Pa. Inspecting the job is Sub-assembly Foreman Lee. Larkin.

"Not a breakdown in five years," says leading farm machine manufacturer

• Several years ago New Holland Machine Company, New Holland, Pa., purchased their first Warco Press . . . an inclinable punch press. It is still working as good as the day they bought it. Since then they have added other Warcos for piercing, blanking and forming a variety of machine parts. "We find these presses very satisfactory," say New Holland officials; "in our five years of using Warcos we have never had a breakdown."

Warco Presses stand up because they are built from the frame out to deliver maximum performance in the most difficult assignments.

THE FINISHED PRODUCT... Warco inclinable punch press had a hand in turning out this smart-looking, smooth-performing Hayliner 86 baler. The machine was designed to bring the average-size farm big baling capacity at smaller baler cost.



Using a 75-ton Warco inclinable punch press, operator Christian Good turns out tongue support parts. Watching the operation is Assistant Foreman Lester Howe. Ten-gauge hot-rolled sheet steel is used for the part.

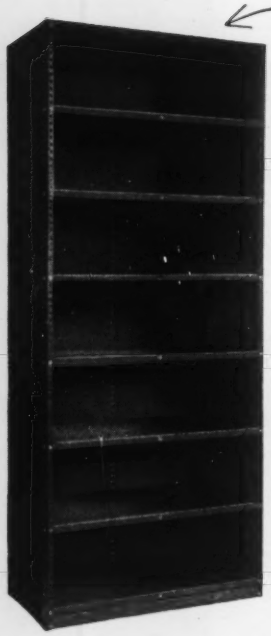
Federal® WELDERS

The Federal Machine and Welder Company

WARREN, OHIO

Warco PRESSES®

HOW TO USE HALLOWELL ADJUSTABLE SHELVING



SELECT THE BASIC SHELVING UNIT

USE IT INDIVIDUALLY
OR IN COMBINATION

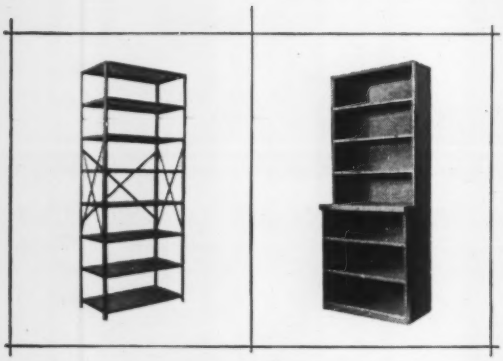
CLIP IN DIVIDERS

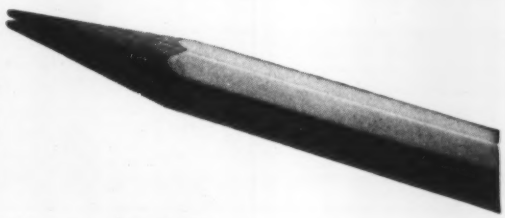
PUT IN SHELF BOXES

ADD SLOPING SHELF UNITS

AND
BIN FRONTS
AS NEEDED

ATTACH SWINGING
OR SLIDING DOORS





Baked-on Enamel Finish · Sturdy Steel Construction · Interchangeable Parts Easy to Assemble · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2111 · Hallowell Shop Equipment Division · Standard Pressed Steel Co., Jenkintown 33, Pa.

HALLOWELL SHOP EQUIPMENT DIVISION
STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN PENNSYLVANIA

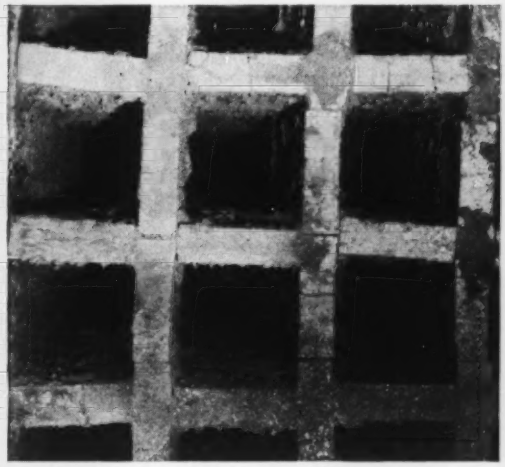
BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

HARBISON-WALKER

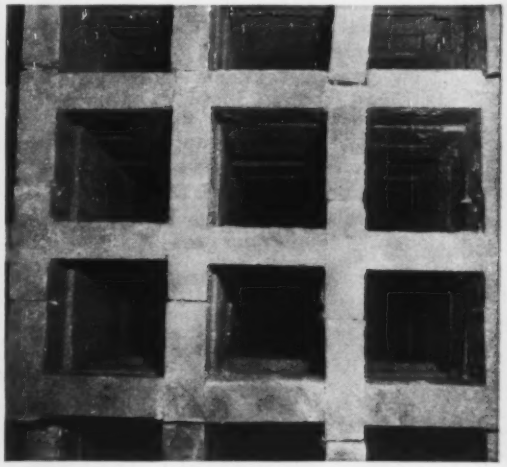
FORSTERITE L

BASIC CHECKERS

provide unusual advantages for open hearth steel furnaces



After two campaigns—378 heats—Forsterite L Open Hearth Checkers appeared as shown above. The friable character of the slight dust build-up is apparent.



Ready to go back into service. Cleaning is quickly and easily accomplished because Forsterite L Checkers resist slagging, spalling and clogging.

With the rapidly increasing use of basic brick checkers for open hearth steel furnaces, many of the various kinds have been in service for careful comparisons. Among the various classes of basic brick used in this application, FORSTERITE L, the magnesium-silicate refractory, shows unusual merit.

Important benefits which contribute to the good economy in the use of FORSTERITE L checkers are briefly enumerated.

1 Increased durability under the most severe operating conditions

FORSTERITE L checkers do not shrink or subside in soaking heats and higher preheat temperatures of the air are feasible. They are highly resistant to slagging and withstand the temperature changes involved without spalling. Because of the excellent stability of mineral composition under the prevailing regenerator conditions, FORSTERITE L brick do not permanently increase in volume nor become weak and friable.

2 Checker cleaning decreased

Due to its chemical composition, iron oxides and basic slag carry-over, do not readily react with FORSTERITE L. These basic fluxes do not wet the FORSTERITE L brick which remain clean and free from excessive clogging. The necessity of cleaning FORSTERITE L checkers used for all or part of the setting is greatly decreased.

3 Greater heat capacity

The inherent properties of the mineral forsterite account for the higher heat capacity of FORSTERITE L brand, than that of alumina-silica refractories. The heat capacity of a checker setting of a given size thus is greatly increased.

4 High efficiency maintained

FORSTERITE L checkers retain their normal texture and are less readily glazed than are various other kinds of basic, high alumina and alumina-silica refractories. High heat absorption is not reduced by increased reflection resulting from glazing.

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES

World's Most Complete Refractories Service

GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

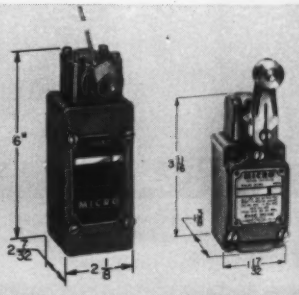
How plant operators use MICRO SWITCH Precision Switches to speed materials handling

Plant engineers find MICRO SWITCH precision switches ideal for keeping production lines running smoothly.

Small in size, high in electrical capacity, versatile in application, these switches may be used everywhere —in process, bulk, flow and level controls; on package and part conveyors; in counting and weighing devices; as manual push-button controls; and to automatically control mechanical motion of machines and equipment.

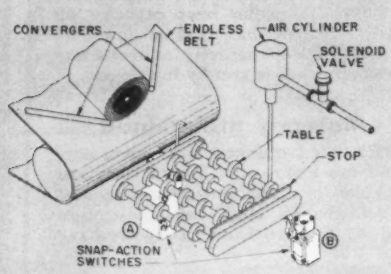
Here are two practical examples of the way these switches have been used to speed materials handling:

Automatically unload tied bundles

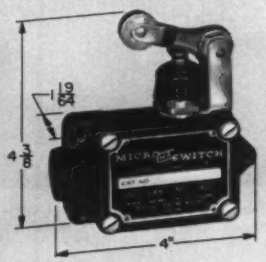


Two MICRO SWITCH precision switches, of different types, unload tied bundles from this conveyor. They also prevent bundles from piling up at the end of the conveyor.

Bundles, which come from the floor above, are centered by two convergers. Each bundle actuates Switch A (with long feeler) as it passes on to the ball bearing table. The switch operates a timing device which stops the conveyor and operates a solenoid air cylinder. This tilts the table, dropping the bundle into a hand truck below. When the table returns to normal position, it actuates small limit Switch B which starts the conveyor again.



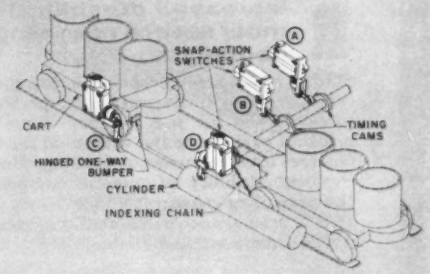
Four switches position moving carts on conveyors



On the forward stroke of a hydraulic cylinder ram the carts are moved forward by a hinged one-way bumper.

The switch circuit ties the hydraulic cycle in with the mechanical timing cycle and prevents the next loading operation until the cylinder ram has moved the preceding carts ahead on the conveyor.

Switch C closes on the forward stroke of the ram. A timing cam closes Switch A. This reverses the hydraulic ram to the back position where it closes Switch D. When Switch B is closed by the timing cam, the ram again moves out and pushes the carts forward on the conveyor.



There is a MICRO SWITCH Distributor near you with complete stocks of switches for plant use applications. Look under "Switches, Electric" in your classified telephone directory.

Are you reading MICRO Tips? Send for this live "how others do it" publication today.

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New Refractories Handbook

written especially for electric furnace operators

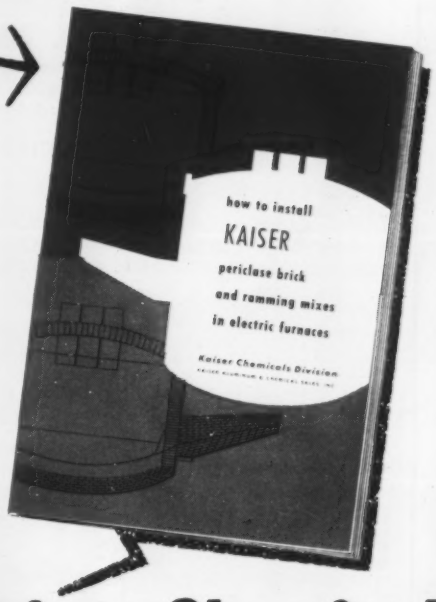
This new booklet is the most important "how to" handbook on refractories installation methods ever written for electric steel-making furnace operators.

Many of the suggestions and recommendations in this 48-page booklet have come from our customers, who cooperated in joint studies of basic brick and ramming mixes in their electric steel furnaces.

All of the recommendations are designed to help you get the greatest savings and the best possible service from proper installations of refractory brick and furnace grains.

this "How To" handbook shows you...

- Methods for installing basic brick
- Sub-hearth construction
- Side wall construction
- Lining around doorway
- Lining pouring spouts
- Roof seal
- Methods for installing ramming mix
- Hearth contour
- Tap hole construction
- Ramming bottoms
- Mixing methods
- Ramming small furnaces
- Ramming large furnaces
- Forms for ramming
- Furnace lining repairs
- Rebuild suggestions
- Suggestions for furnace heat up
- Equipment & materials recommendations



Kaiser Chemicals

pioneers in modern basic refractories

SEND THIS COUPON TODAY FOR YOUR FREE COPIES

We suggest that you order enough copies of this booklet for every member of your organization concerned with improved operation of your electric steel furnaces.

Kaiser Chemicals Division, Dept. R7231
Kaiser Aluminum & Chemical Sales, Inc.
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Please send_____copies of your free booklet entitled "How to Install Kaiser Periclase Brick and Ramming Mixes in Electric Furnaces."

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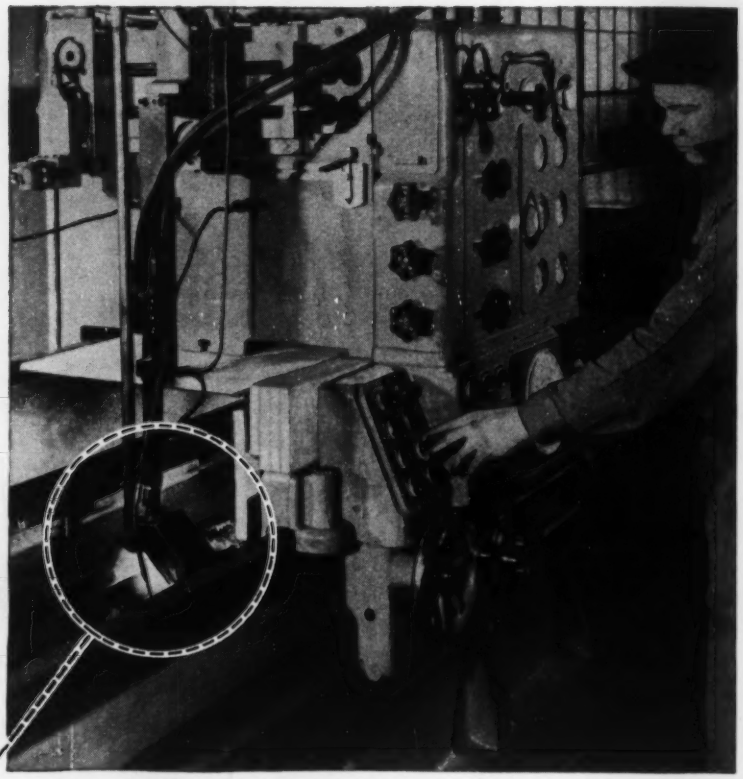
HIGH SPEED FLAME-HARDENING



Cross-section view shows uniform depth of hardened surface.

SPECIAL MACHINE UPS LIFE OF GRAPHITIC STEEL PARTS

LINDE engineers have assisted Cincinnati Steel Treating Company in developing a flame hardening machine which increases service life of 16 ft. long, graphitic carbon steel lathe ways . . . Development of this automatic, high speed machine is another example of how LINDE Service Engineers are helping LINDE's customers up production speed and unit quality through co-operative research engineering.

With this new machine, a lathe way to be treated is placed on a magnetic chuck in a water filled channel. Flame-hardening heads and control mechanism move at predetermined speeds along the part. After it cools, the lathe way is placed in a refrigerator for 24 hours which stabilizes the steel, and brings its case hardness to a minimum of 60 Rockwell "C" scale.

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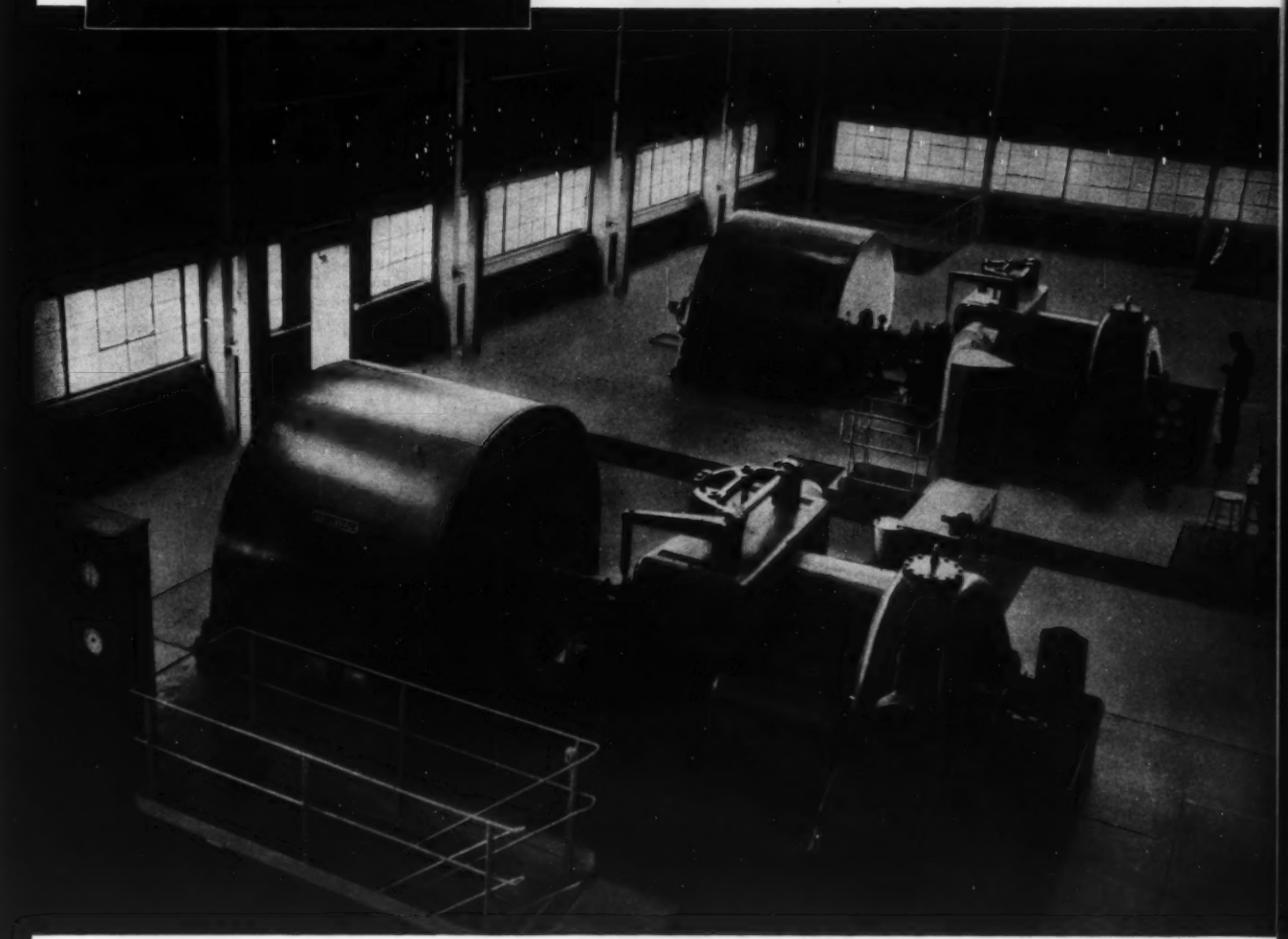
BLAST FURNACE BLOWERS

deliver 110,000 cfm each for McLouth Steel



These two De Laval turbine-driven centrifugal blowers do a round-the-clock job in the McLouth Steel plant, Trenton, Michigan. Each has a rated capacity of 110,000 cfm of air; discharge pressure is 30 psig. Each is driven by a 12,400 hp, 2950 rpm De Laval steam turbine operating under steam conditions of 600 psig, 825 F with 2″ hg.

De Laval compressors are designed individually for each application to assure maximum efficiency and range of operation. Construction is rugged throughout. Casings and perfectly balanced rotors are built to take punishment. All parts are precision-made to limit gages. Materials are selected which will best meet the particular conditions of corrosion, pressure and temperature.

De Laval centrifugal blowers are built in single and multi-stage types to supply air in volumes up to 150,000 cfm for all classes of service in steel, gas and coke plants. The wealth of application experience acquired by De Laval over the years assures a correct and economical solution to your blower problem.

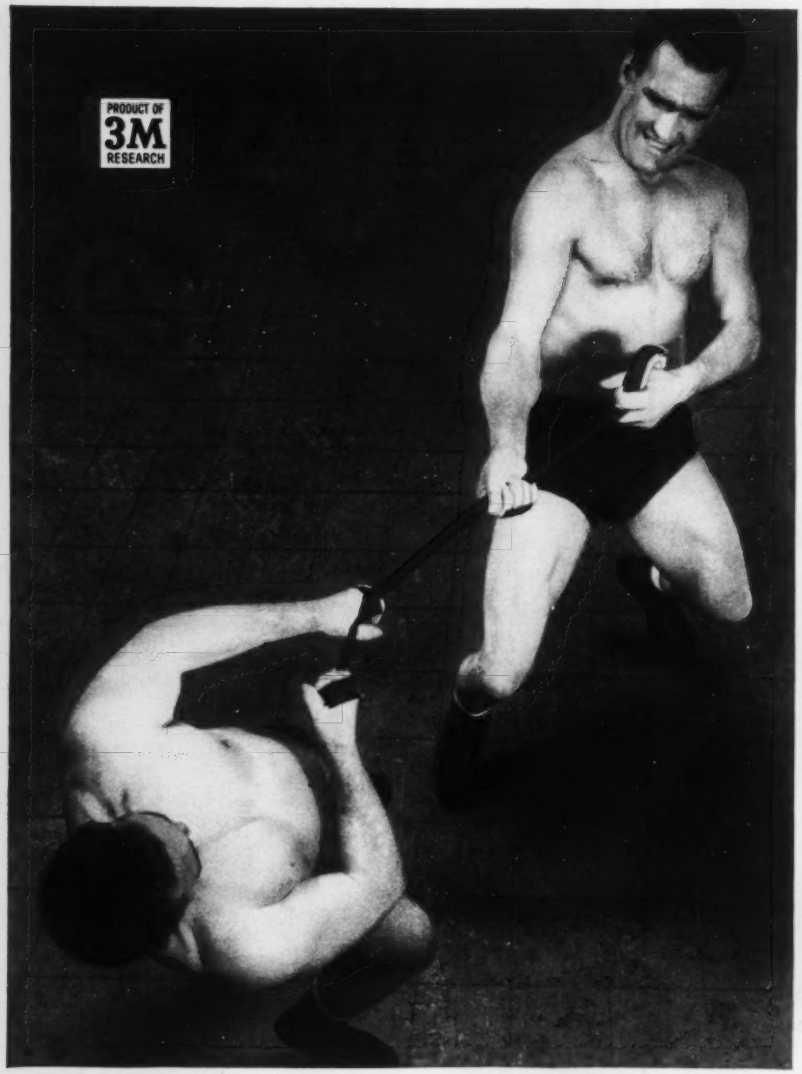
Send for Bulletin 0504

DE LAVAL *Centrifugal Blowers*

DE LAVAL STEAM TURBINE COMPANY

860 Nottingham Way, Trenton 2, New Jersey

DL 360



World's strongest tape?

Even 468 lbs. of wrestlers can't break it! "Scotch" Brand Filament Tape is amazingly strong, super shock-resistant. Thousands of filaments imbedded in the pressure-sensitive adhesive give it up to 500 lbs. tensile strength per inch of width. Four colors: Red, Blue, Black, White and Transparent. Ask your regular tape distributor how you can use it for heavy-duty packaging, or write us direct. Always specify "Scotch" Brand, the *quality* tape . . . and *stick* with it!

FILAMENT TAPE . . . *one of more than 300 pressure-sensitive tapes for industry, trademarked . . .*

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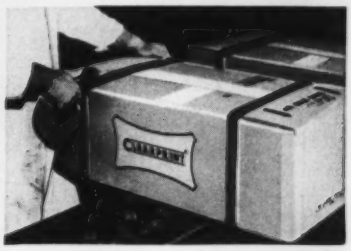
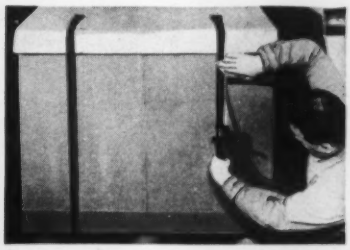
SCOTCH BRAND

Look what you can do with it!

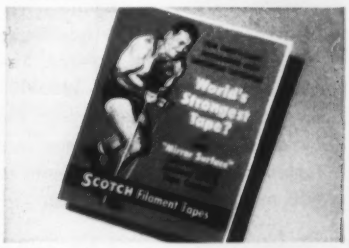


HARD-TO-HANDLE materials, such as paper sheets in bulk, can be easily packaged using "Scotch" Brand Filament Tape. Super-strong tape both seals and reinforces covering.



LARGE cartons and expendable pallets are easily closed and reinforced with "Scotch" Filament Tape. Tape won't cut workmen's hands; won't harm contents; is easily disposed of.

MAKE your own containers for odd-sized or odd-shaped products with fibreboard padding and "Scotch" Filament Tape. "Mirror surface" adhesive sticks at a touch; holds securely.



SEND FOR free booklet showing how "Scotch" Brand Filament Tape can help solve your heavy-duty packaging and materials-handling problems. Write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. GK-27.

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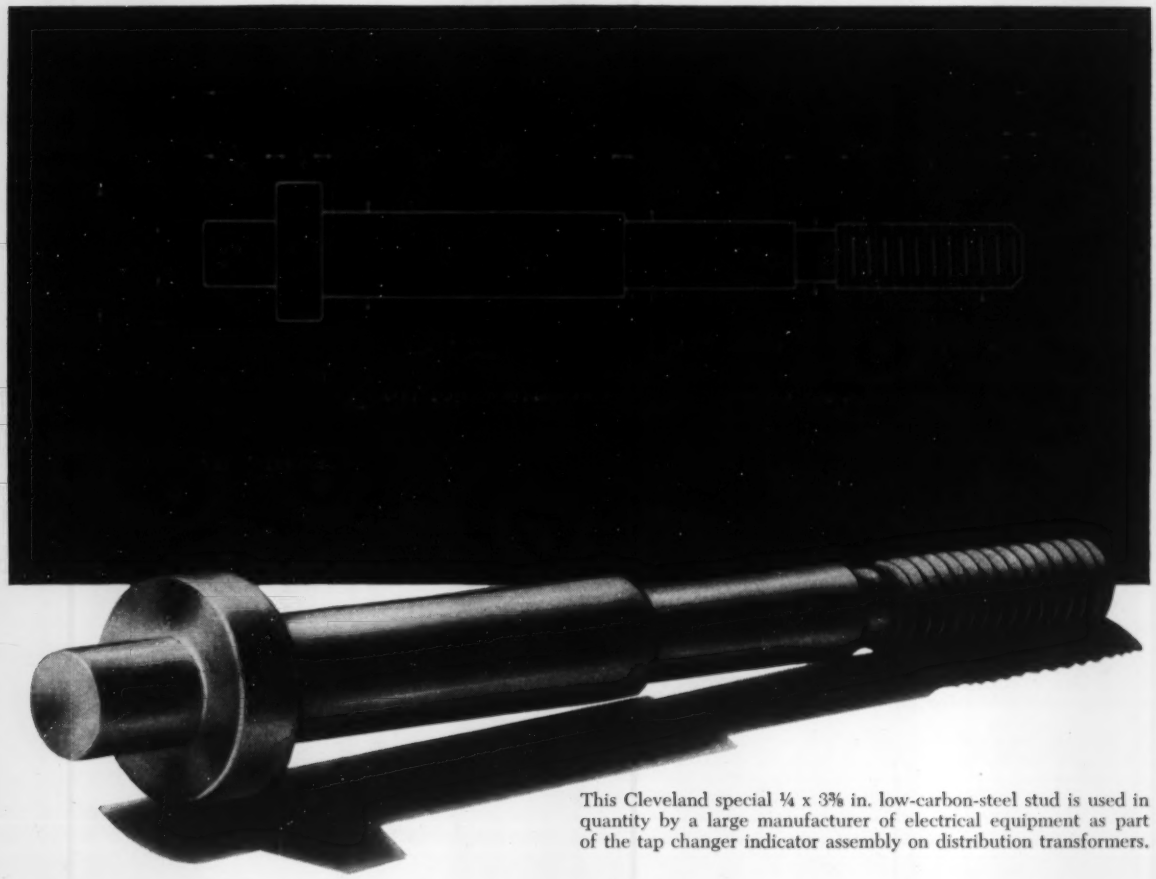
CLEAN, UNIFORM BILLETS—STRIP—RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES



This Cleveland special ¼ x 3⅜ in. low-carbon-steel stud is used in quantity by a large manufacturer of electrical equipment as part of the tap changer indicator assembly on distribution transformers.

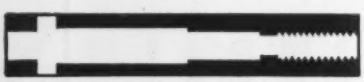
Cost of special collar stud is cut 20% by Cleveland's cold forming techniques

The famous Kaufman Double Extrusion Process which turns out millions of Cleveland precision cap screws yearly is highly adaptable to low-cost production of your fastener-type specials.

The tap changer stud pictured above is typical. Used by a well-known electrical equipment manufacturer, it was previously cut from bar stock. The special head, double shoulders, and groove above the threads meant numerous machining operations and considerable scrap.

Cleveland now cold forms this special stud at 20% less cost to the customer, while holding the specified .005 in. tolerance. And the part is stronger. In the head, threads and fillets, grain flow is symmetrical and unbroken. In addition, the forging action of the Kaufman process toughens surface metal while leaving the core ductile. Both fatigue resistance and tensile strength are thus increased.

We are regularly cold forming close-tolerance specials—many with unusual or extreme upsets—in large quantities. So whether your part is simple or complex, it will pay you to check with Cleveland, particularly at the design stage. There is an excellent chance that through cold forming we can cut the cost and improve the physical properties of the part you have in mind.



Black area represents metal that had to be cut away when stud was produced by machining. In the Cleveland cold forming process almost all the metal in the working slug is present in the finished part. The customer saves the difference.

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2. AUSTENITIC CHROMIUM-MANGANESE-NICKEL STEELS CONTAINING NITROGEN. Circle F-8775.

3. ELECTROLYTIC CHROMIUM AND MANGANESE BOOKLET. Circle F-20,025.

New Stainless Steels

4. NEW STAINLESS STEELS, High-manganese, extra low-carbon, wrought precipitation-hardenable, and cast precipitation-hardenable grades. Circle F-20,024.

Melting Practices

5. OBSERVATIONS OF STAINLESS STEEL MELTING PRACTICES. Circle F-20,006.

6. OXYGEN BLOWING RATE IN STAINLESS STEEL MELTING. Circle F-20,032.

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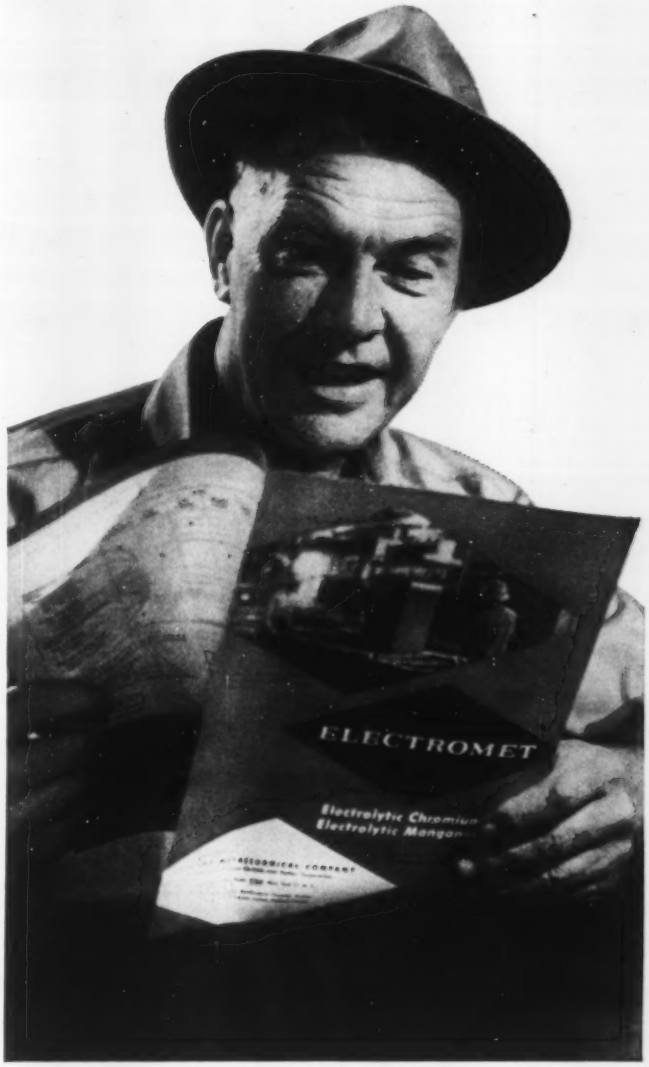

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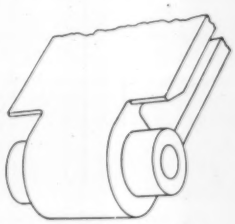

Typical heavy-duty link with cast pin.

FOR LIGHTER PARTS, SPECIFY THERMALLOY GENERAL PURPOSE

A loop-type casting design, suitable for general heat-treat applications in industry. Available in either 3″ or 4″ pitch. The 3″ pitch is a light-duty general-purpose belt, weighing 17 lbs. per sq. ft. The 4″ pitch is primarily designed for intermediate loads of somewhat larger parts, and weighs 21 lbs. per sq. ft.

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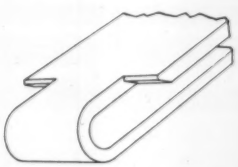

Typical 3″ or 4″ pitch center link of loop-type casting design.

WRITE FOR BULLETIN T-241

. . . giving additional design and application information on both Heavy-Duty and General-Purpose Thermalloy Conveyor Belts. Address: Electro-Alloys Division, 8042 Taylor St., Elyria, Ohio.

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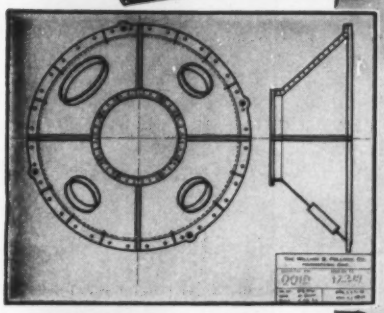
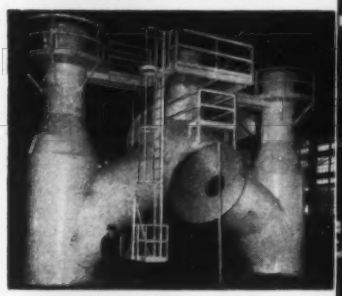
ELECTRO-ALLOYS DIVISION ELYRIA, OHIO

POLLOCK

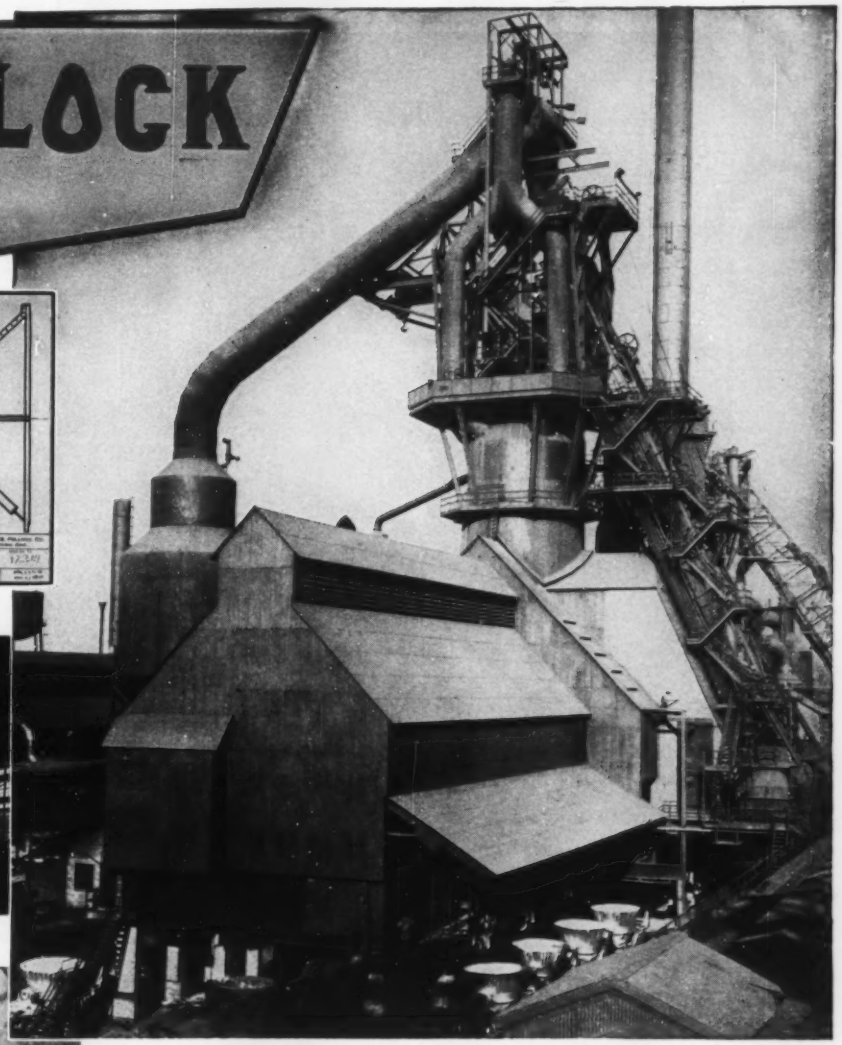


ENGINEERING



SHOP FABRICATION

FIELD ERECTION



Correlating the skills of Pollock engineering, fabrication and field erection to specific operational requirements of The Youngstown Sheet & Tube Company are evidenced in this blast furnace. In addition to furnishing the steel work for this blast furnace, Pollock designed and built auxiliary equipment, including the hot metal ladle cars and cinder cars shown in the above picture. The experience which the Pollock Company has gathered in over eighty-five years is available to you in planning your new projects.

Blast furnace STEEL WORK

POLLOCK

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YOUNGSTOWN - OHIO
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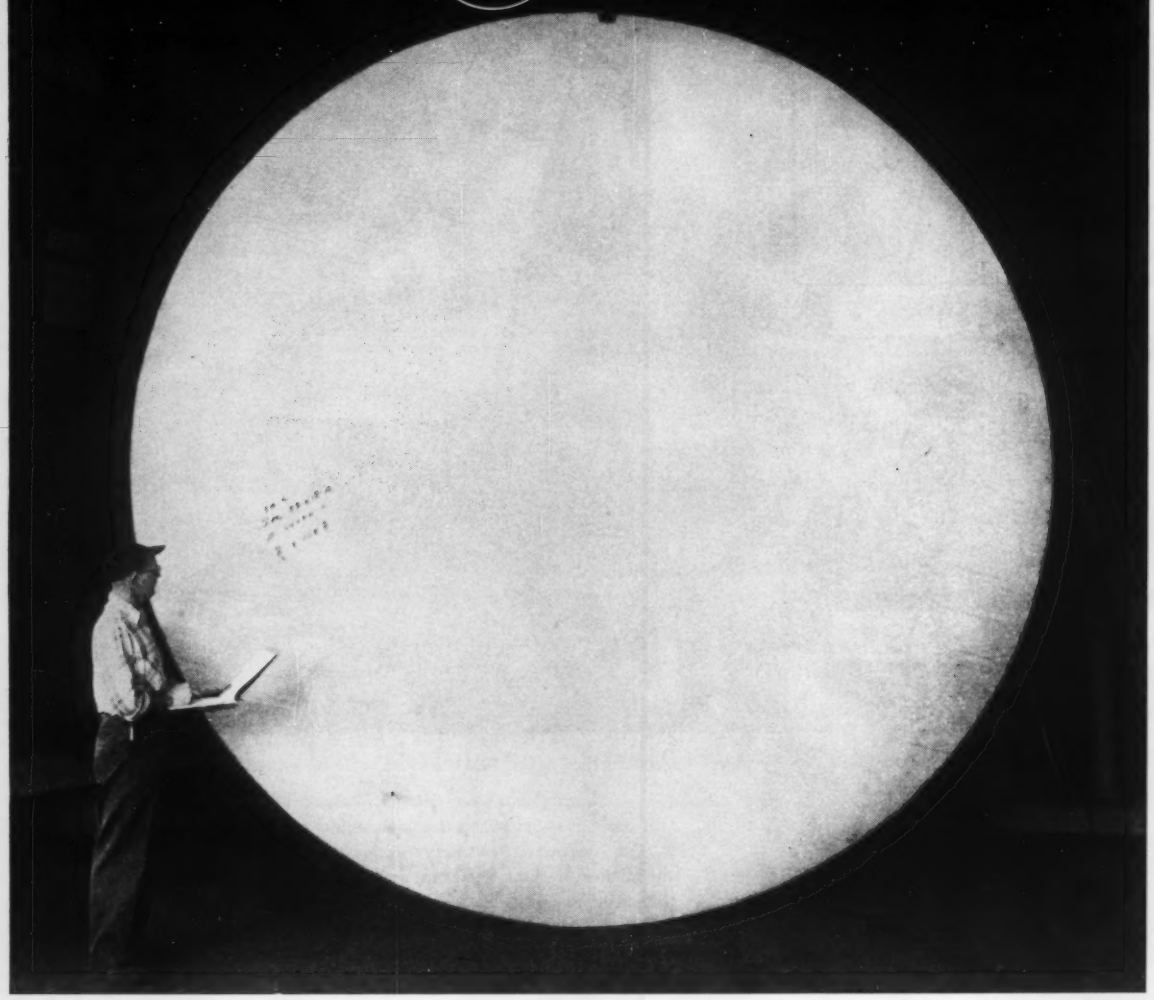
BLAST FURNACES • HOT METAL CARS AND LADLES • CINDER AND SLAG CARS • INGOT MOULD CARS • CHARGING BOX CARS • WELDED OPEN HEARTH LADLES

WHY BUY STAINLESS STEEL squares WHEN IT'S circles YOU NEED?



This circle, 9/16" thick x 164" diameter, is one piece of Type 316L stainless steel. Had the customer ordered a square, he would have paid freight on a half-ton of excess material. Also, he would have had the problem and expense of handling the square and cutting the circle.

Here are four sound reasons why Carlson customers save time and money when they order the circles they want—rather than the squares they have to cut . . .

1. If the gauge and size are circle-shearable, there is no extra charge for cutting the circle. This saves cutting labor and scrap handling expense.
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3. Because circles weigh approximately 25% less than squares, there's a substantial saving in transportation costs.
4. Small or medium size circles are often available from stock when squares may not be. The delivery time saved can be an important factor.

When you need stainless steel circles, come to Carlson where we specialize in stainless steel . . . that's your guarantee of dependable service.

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For utmost efficiency in overhead handling, Yale offers many hoists suited to intra-plant operations. The Yale Cable King Electric Hoist, for example, handles up to 15 tons... gives quick-response pushbutton action... is equipped with Yale's exclusive air-cooling system to prevent overheating during continuous work cycles.

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GIVE THEM PRECISE, VARIABLE SPEED CONTROL...

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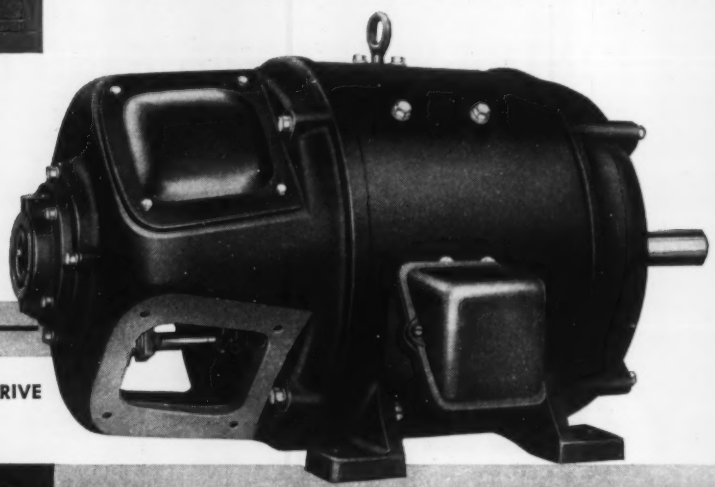
Century has more than 50 years' experience in engineering DC motors. For information on any motor application, call or write your nearby Century District Sales Office or Authorized Distributor.



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Among these Roebling materials are zig-zag and no-sag wires; mechanical and valve spring wires; music wire; clock and motor type spring wires; flat spring steel and upholstery spring wire of all types. The variety of parts into which these are formed is almost endless, but manufacturers all report that Roebling quality and uniformity reduce machine downtime.

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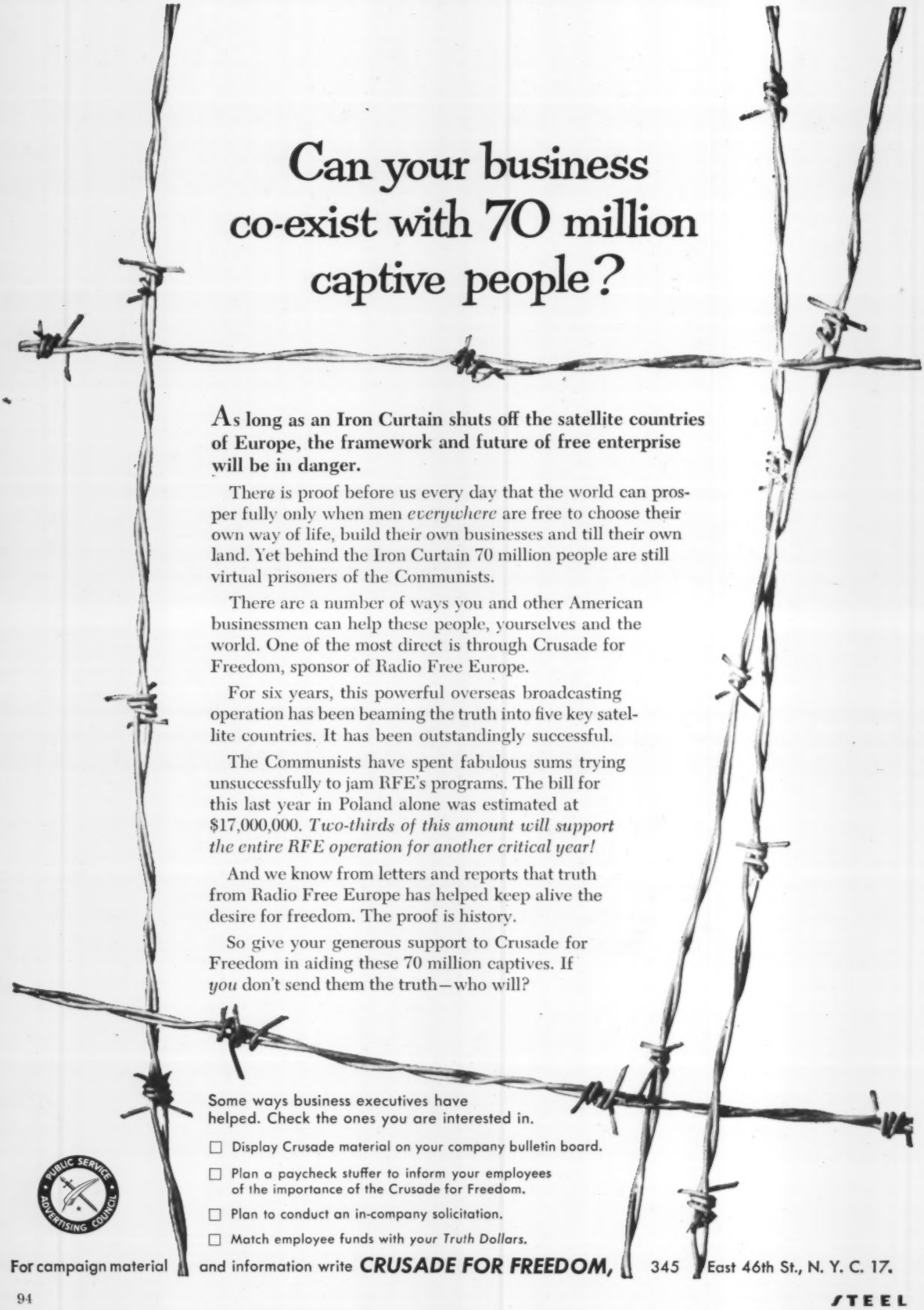

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As long as an Iron Curtain shuts off the satellite countries of Europe, the framework and future of free enterprise will be in danger.

There is proof before us every day that the world can prosper fully only when men *everywhere* are free to choose their own way of life, build their own businesses and till their own land. Yet behind the Iron Curtain 70 million people are still virtual prisoners of the Communists.

There are a number of ways you and other American businessmen can help these people, yourselves and the world. One of the most direct is through Crusade for Freedom, sponsor of Radio Free Europe.

For six years, this powerful overseas broadcasting operation has been beaming the truth into five key satellite countries. It has been outstandingly successful.

The Communists have spent fabulous sums trying unsuccessfully to jam RFE's programs. The bill for this last year in Poland alone was estimated at $17,000,000. *Two-thirds of this amount will support the entire RFE operation for another critical year!*

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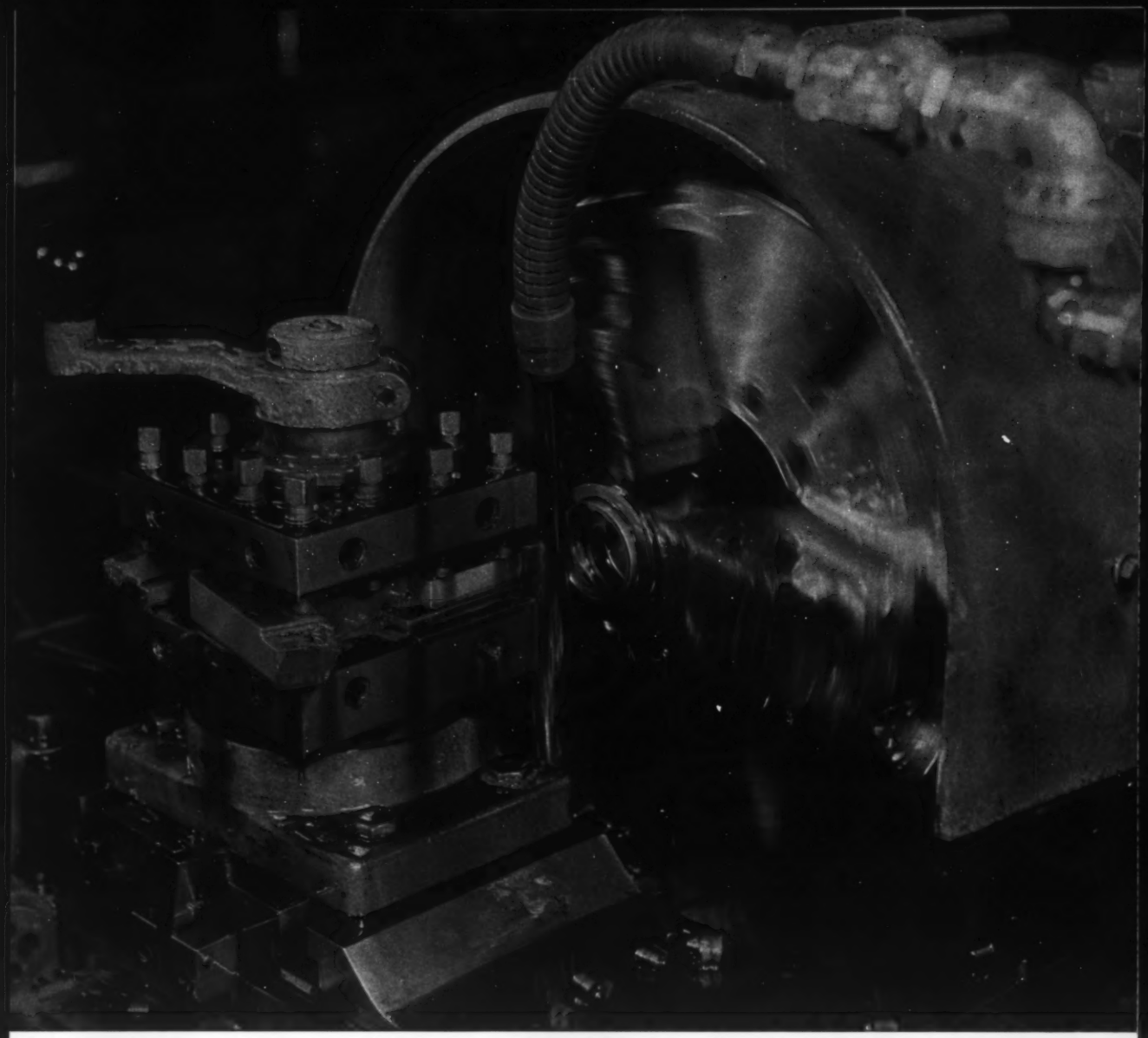
So give your generous support to Crusade for Freedom in aiding these 70 million captives. If *you* don't send them the truth—who will?

Some ways business executives have helped. Check the ones you are interested in.

- ☐ Display Crusade material on your company bulletin board.
- ☐ Plan a paycheck stuffer to inform your employees of the importance of the Crusade for Freedom.
- ☐ Plan to conduct an in-company solicitation.
- ☐ Match employee funds with *your Truth Dollars.*

PUBLIC SERVICE ADVERTISING COUNCIL

For campaign material and information write **CRUSADE FOR FREEDOM,** 345 East 46th St., N. Y. C. 17.



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- Each Gulfcut oil scientifically compounded to meet exact needs

As an aid to simplification, all the famous Gulf cutting oils are now available as one complete line, under one name: GULFCUT. By ordering "Gulfcut" you can select from 9 different shop-tested cutting oils—and there's a proper type for every metal cutting need. The Gulfcut line includes mineral-lard oil, sulfurized-mineral oils, sulfurized-mineral-lard oils, sulfo-chlorinated-lard oils, and emulsifying oils. Your Gulf Sales Engineer will gladly show how Gulfcut cutting oils can mean longer tool life and reduced machining costs in your shop!

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Non-staining, non-corrosive mineral-lard oils, generally recommended for machining non-ferrous metals.

GULFCUT 21A, 21B AND 21C
Sulfurized-mineral oils made by a special Gulf process to provide greater sulfur activity over a wide range of machining operations. Transparent and relatively light in color.

GULFCUT 31A AND 31C
Sulfurized-mineral-lard oils that excel in performance over a wide range of machining operations on many types of steel. Have outstanding anti-weld properties and load carrying ability. Sulfur is combined in three different forms for maximum chemical activity.

GULFCUT 41A, 41B AND 41C
Sulfo-chlorinated-lard oils for high production jobs on automatic machines. Engineered with the proper combination of sulfur, chlorine and fatty oil. They also provide proper lubrication for machine tools.

GULFCUT 41TG
Sulfo-chlorinated-lard oil specifically compounded for thread grinding operations.

GULFCUT 43A
Sulfo-chlorinated oil for high production machines requiring an oil of this type for pipe cutting and threading, screw and bolt making machines, and cutting operations on steels with free and moderate machinability characteristics. Contains a corrosion inhibitor to protect ferrous metals and machine parts.

GULFCUT 43B
Specially blended sulfo-chlorinated-lard oil for high production machines requiring an oil of its viscosity and compounding. Dual purpose—suitable for machine lubrication as well as for cutting operations.

GULFCUT 45A AND 45B
High quality sulfo-chlorinated-lard oils with excellent load carrying and anti-weld characteristics to insure best results on the most difficult jobs. Have heavy concentrations of sulfur, chlorine and fatty oil. May be diluted for less difficult jobs.

GULFCUT 51A
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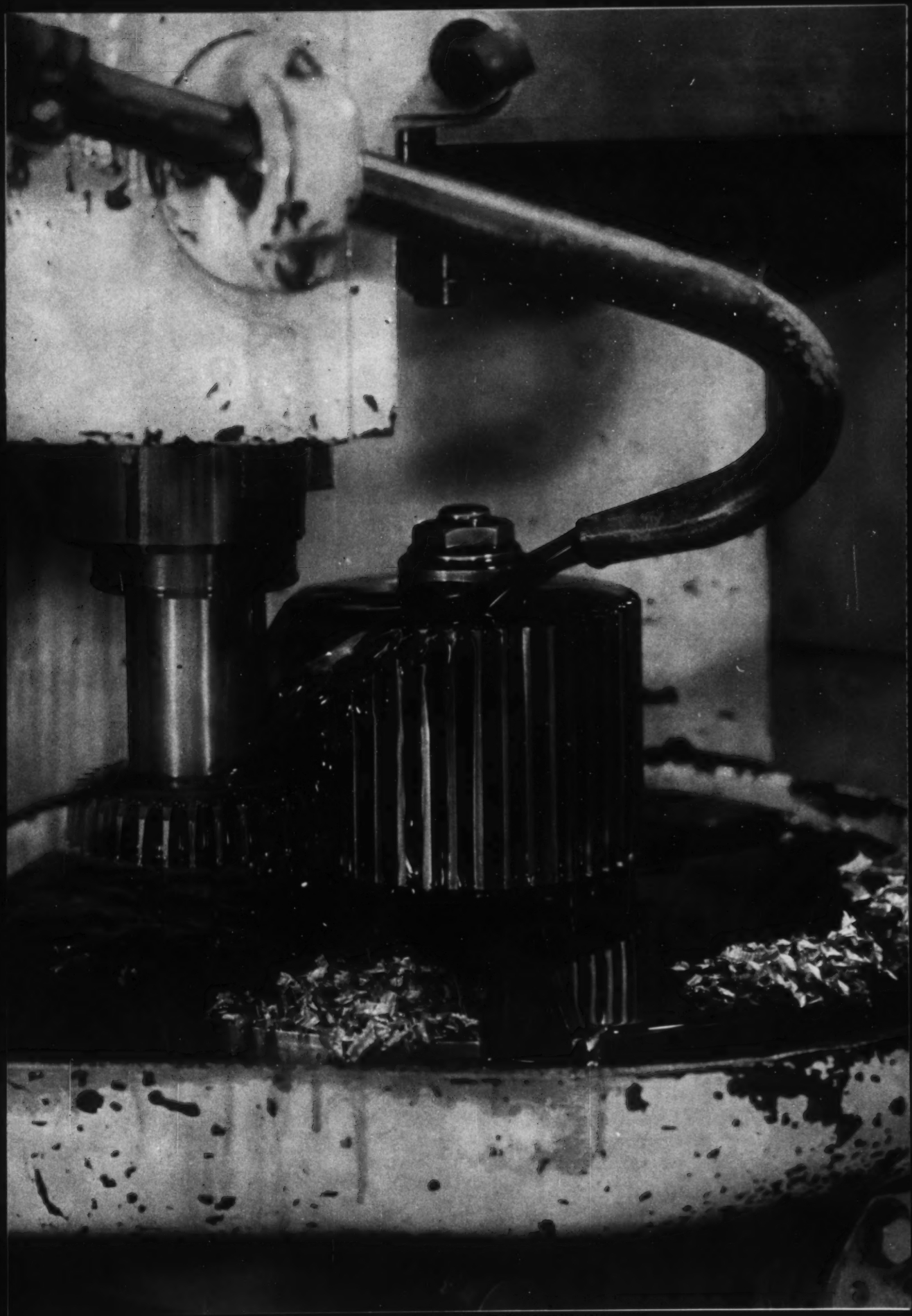

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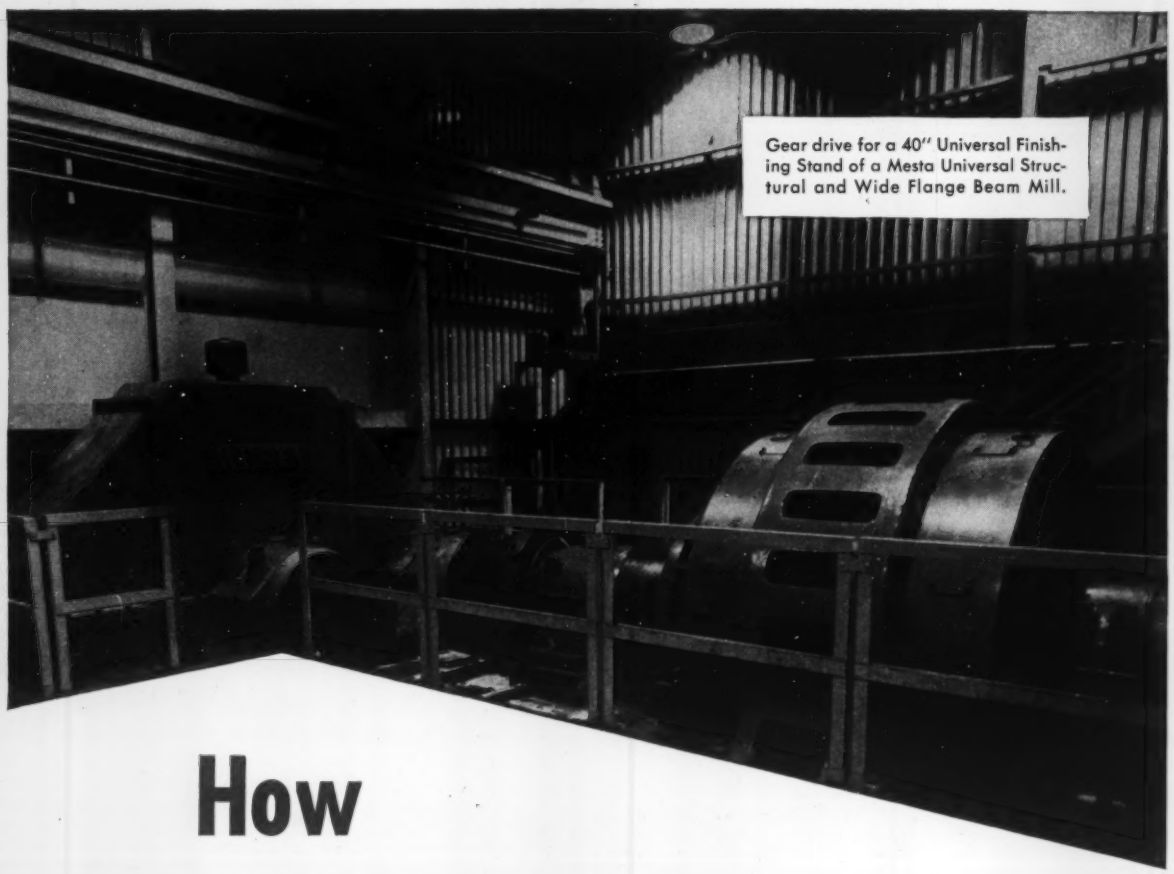

Gear drive for a 40" Universal Finishing Stand of a Mesta Universal Structural and Wide Flange Beam Mill.

How to protect gears when the pressure's on

Gear drives running under long, heavy duty service —or shock loads—need a lubricant that will adhere and protect metal surfaces. *Texaco Meropa Lubricant* does that dependably. It contains special polar additives that insure greater adhesion to metal under *all* conditions. *Texaco Meropa Lubricant* stays where it's needed—on the gear surfaces.

Extreme Pressure properties of *Texaco Meropa Lubricant* give its lubricating film greater toughness for better gear protection—at far beyond normal operating requirements. It resists heat—has great stability—won't foam. And it's noncorrosive to gears and bearings.

Your nearby Texaco Lubrication Engineer will gladly help you get smoother gear performance, and reduce maintenance costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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FOR STEEL MILL GEAR DRIVES

TUNE IN . . . METROPOLITAN OPERA RADIO BROADCASTS EVERY SATURDAY AFTERNOON

STEEL
February 18, 1957

Metalworking Outlook

Challenge to Equipment Builders

One of the plastic industry's major problems: Equipment. At its Chicago convention an oft-heard comment was: "We need better equipment. Not modified metalworking units, but machines designed specifically for better handling and higher production of reinforced plastic products." Shipments of items made of reinforced plastic totaled 140 million lb in 1956, 30 per cent ahead of 1955's. Industry leaders—many of them metalworkers that have entered the field to supplement their metal lines—predict a similar increase this year.

Memo on Nuclear Power

Five, perhaps six, nuclear power plants will be generating electricity in the U.S. before this year is out, predicts Lewis A. Strauss, chairman of the Atomic Energy Commission. The first, at the Argonne National Laboratory near Chicago, is already operating (STEEL, Feb. 11, p. 122). Capacity of the plants will total some 87,000 kw. Another 15 are under construction or in the planning stage. Companies making atomic equipment for these facilities can expect sales of $1 billion over the next decade, believes Dr. Chauncey Starr, vice president of North American Aviation Inc. But he notes profits from that business will be thin for at least the next five years because a company must spend about $16 million to get into production.

Program for Atomic Subs

Newport News Shipbuilding & Drydock Co. has a $24-million contract to build a nuclear submarine. Of 15 nuclear subs authorized through fiscal 1957, 14 are built or under construction. General Dynamics Corp.'s Electric Boat Division has built two, is working on four more. Naval shipyards are building five, and Ingalls Shipbuilding Corp. has contracts for two.

"No Major Depression"

Total output of goods and services in the U.S. will increase about 11 per cent annually over the next 20 years. Industry production will rise 5 per cent annually. The general price level will continue upward—probably 3 per cent per year. Total steel production will increase at an average annual rate of about 4 per cent. So predicts Edward J. Verity, staff economist of Lukens Steel Co. He says: The weight of evidence "negates the possibility of a major depression."

Limited by the Soo

Vessels over 730 ft long and with a beam of more than 75 ft will be denied passage through the Soo Canal, says the Corps of Engineers. No vessels that large are operating on the Great Lakes, but the ruling is seen as a construction guide to shipbuilders and operators.

Prospects for Copper

Chile expects to produce 550,000 tons of copper this year, compared with 443,000 tons last year. Some 60 per cent of the 1957 production has al-

Technical Outlook—p. 149 Market Outlook—p. 227

ready been contracted for other than U.S. buyers. When the East Coast dock situation clears up and normal imports of the red metal can be resumed, look for another price drop. The U.S. must import about one-third of its requirements. But while it is forced to rely only on domestic production, look for the price to hold at about 34 cents per pound (see page 118).

Still the Nickel Pickle

The nickel shortage isn't being helped by the strike at International Nickel Co.'s Huntington, W. Va., rolling mill. As of Feb. 13, the walkout had been going on a month. United Steelworkers of America wants a steel-type pact; Inco refuses a pattern settlement. That situation is one of several in the nickel area that prompted Dr. Arthur Flemming to continue (for a while) as a consultant to the Office of Defense Mobilization. He has resigned as ODM director and was succeeded by Gordon Gray, former assistant secretary of defense.

Mr. Reuther Goes to Minneapolis

Watch the results of Walter Reuther's visit to Minneapolis on Feb. 25. The UAW president will attempt to persuade members of the Federation of Honeywell Engineers to affiliate with the United Auto Workers. If he succeeds, it will be a major victory in the union's drive to organize white-collar workers. The federation represents about 2000 professional engineers and technicians at Minneapolis-Honeywell Regulator Co. Originally, the group was composed mainly of engineers, but now almost 60 per cent of the members are technicians.

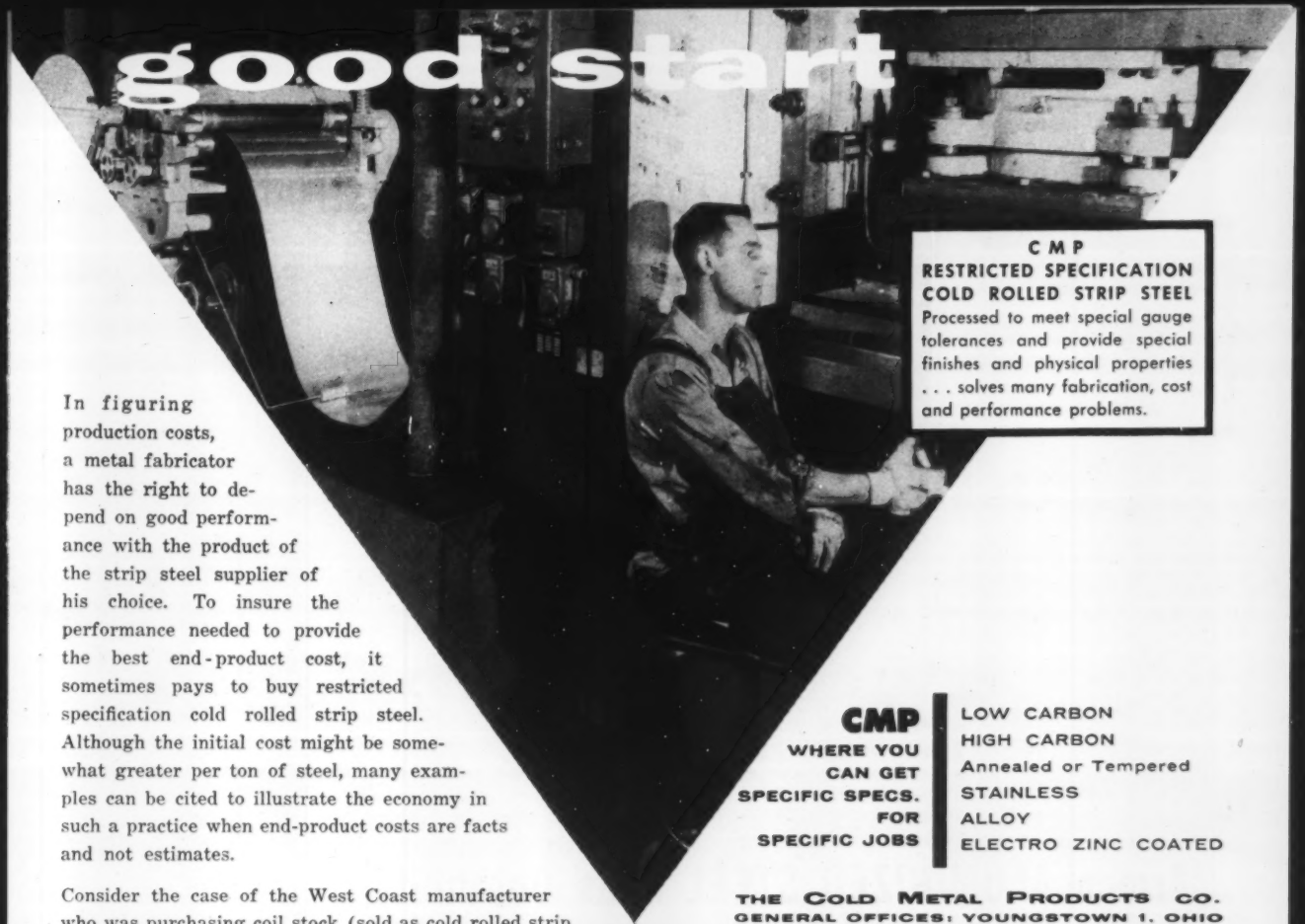
Capital Erosion

American industry this year will pay income taxes on about $6 billion in illusory "profits," predicts the Machinery & Allied Products Institute. Those "profits" result from the underdepreciation of capital assets as a result of inflation. Because industry must depreciate on the basis of an asset's original cost, the nation's tax system gives no recognition to the problem of the replacement's cost, which is invariably higher on long term assets because of the steadily rising price level. "The deficiency," says MAPI, "is greater today than ever. Historical-cost tax depreciation is a built-in decelerator of progress."

Straws in the Wind

Shipbuilders will get only 60 per cent of their steel needs until mid-1958, says Federal Maritime Administrator Clarence G. Morse . . . Westinghouse Electric Corp. has slated capital expenditures of $75 million in 1957, compared with $50 million in each of the last two years . . . New construction activity was at a seasonally adjusted annual rate of $44.8 billion in January, a record for the month.

good start



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In figuring production costs, a metal fabricator has the right to depend on good performance with the product of the strip steel supplier of his choice. To insure the performance needed to provide the best end-product cost, it sometimes pays to buy restricted specification cold rolled strip steel. Although the initial cost might be somewhat greater per ton of steel, many examples can be cited to illustrate the economy in such a practice when end-product costs are facts and not estimates.

Consider the case of the West Coast manufacturer who was purchasing coil stock (sold as cold rolled strip steel) for a forming operation where close gauge tolerance was not of greatest importance. (However, the drawing quality, because of chemistry, was not uniform and die costs and rejects were causing expensive down time and yield losses.) Switching to a **CMP** restricted specification strip, the manufacturer obtained a uniformity in coil after coil that eliminated these problems and provided an end product cost much below his former cost even though his initial steel costs were higher.

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Increased production, reduced slow-downs, lower die costs, meets feed and speed requirements of automatic equipment and yields more finished parts per hundred pounds.

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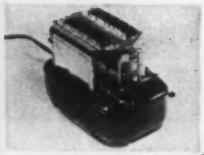
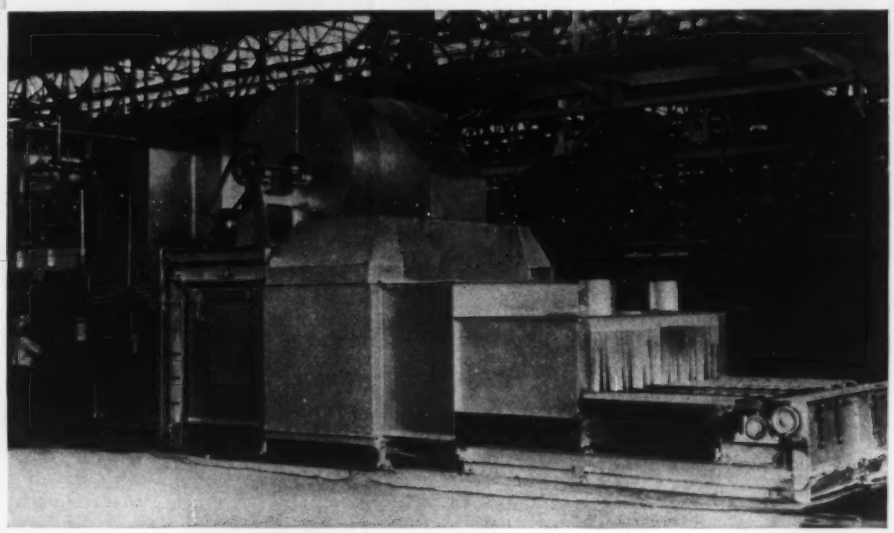


From Toasters to Industrial Ovens...



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Designers utilize unique combination of resistance to heat and corrosion, high heat reflectivity and economy offered by special aluminum-coated Armco Steel.

Armco ALUMINIZED STEEL® Type 1, sheet steel hot-dip coated on both sides with aluminum, combines the surface characteristics of aluminum with the mechanical properties of steel. It offers product-improving advantages unobtainable with either metal alone.

High Heat Reflectivity—Up to 900 F, ALUMINIZED STEEL Type 1 reflects about 80% of radiant heat. You can keep heat where you want it, achieve greater efficiency.

Resistance to Heat and Corrosion—ALUMINIZED STEEL Type 1 withstands temperatures to about 900 F without discoloration, and up to 1250 F without destructive scaling. Good corrosion resistance in applications where heat and corrosion are combined means economical durability. And the steel base under the aluminum coating assures strength and rigidity at high temperatures.

Low Cost—Combining the advantages of two metals in one, ALUMINIZED STEEL can reduce your material costs. It costs less than any other metal that can equal its performance. If you make products exposed to heat—from small appliances to large industrial ovens—consider the advantages Armco ALUMINIZED STEEL Type 1 offers you. It's available in a wide range of sizes and gages in sheets, sheet coils and welded tubing.

Just fill out and mail the coupon for complete information on this special Armco Steel.

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Labor's New Threat

For some time, labor has made no secret of the fact that the short work week is high on its list of never ending demands. Not too long ago, it appeared to be only a remote possibility. Now it is imminent. (See article on page 107.)

In June, 1955, UAW President Walter Reuther achieved a major victory when he signed up the auto companies for 26 weeks of unemployment pay at 60 to 65 per cent of regular take-home pay, a general wage increase, extra wages for skilled workers, more health insurance, more holiday pay and longer vacations.

But his victory lost some of its luster when USW President David J. McDonald won more favorable terms from the can companies and the steel industry. They called for unemployment compensation for 52 weeks, as well as wage increases and other benefits.

In the months ahead, Walter Reuther will campaign to offset the advantage gained by Mr. McDonald. What the UAW wants is on the record. Two years ago, it said: "After the guaranteed wage has been secured, the shorter work week will take its place at the top of our collective bargaining agenda, along with the continuing fight for higher living standards."

Last year, Mr. Reuther predicted that his union will win a 100 per cent guaranteed annual wage that will cost employers as much to keep workers unemployed as employed—plus the short work week.

Last week, the UAW took a dose of the medicine it expects to give the auto industry when a new contract is negotiated early in 1958. Office workers employed by UAW's Local 600 were placed on a 30-hour week.

What kind of a week should you plan for?

The straight-time week may take one of several forms: Five days with work periods of 6, 6½ or 7 hours; possibly four 8-hour days; possibly five 8-hour days, with increased vacation time.

Whatever the straight-time arrangement, the number of hours worked per week will not drop much below 37 by 1965. If the short, straight-time week comes, it will mean more overtime and a higher labor bill.

It could greatly affect your production scheduling, inventory policy, distribution, over-all costs and pricing.

Labor's new threat must be studied now. What will it do to your business?

Irwin H. Such

EDITOR-IN-CHIEF

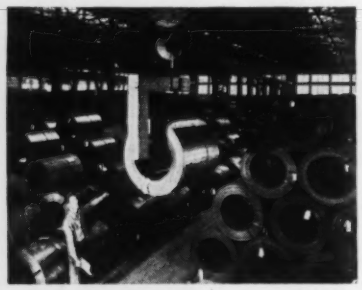
STEEL BUYERS GUIDE to Ryerson Products and Services

You can draw on your nearby Ryerson plant for an almost endless number of products and services—and the more you concentrate your purchases at one source, the more you save. Ryerson products not pictured here include: Re-bars, expanded metal, grating, plastic pipe, machinery and tools, etc. See your Ryerson catalog for complete list and write for descriptive literature.

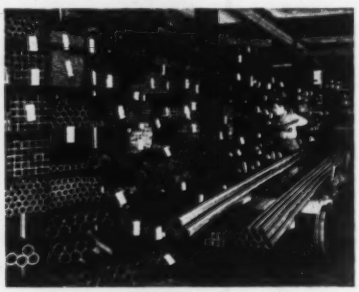
BARS—The most complete range of types, shapes and sizes as well as the largest tonnage.

STRUCTURALS — I-beams, H-beams, channels, angles, tees and zees—all to ASTM spec. A-7.

PLATES—14 types including special low carbon plates for forming and welding, leaded New E-Z-Cut, etc.



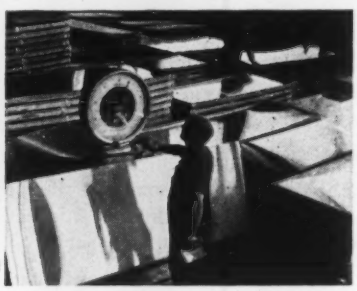
SHEETS & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



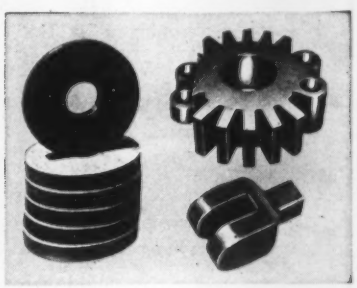
TUBING—Seamless and welded mechanical tubing, fluid power tubing, structural and boiler tubes, etc.

C. F. BARS—Cold finished steel for every use: screw steel, Ledloy, accuracy stock, machinery steel, shafting, etc.

ALLOYS—Every type including leaded alloys for fastest machining, all performance-proved by tests.



STAINLESS—Allegheny stainless in over 2,221 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



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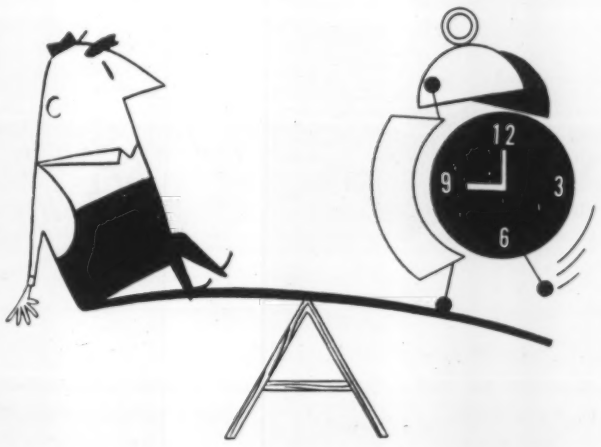


Rise in Productivity Parallels Drop in Hours

	Manufacturing Productivity (Annual percentage gains)	Drop in Nonagricultural Hours (Average weekly)
1947-1953	3.4	40.5 to 39.2
1939-1947	0.5	41.1 to 40.5
1929-1939	2.2	44.5 to 41.1
1920-1929	5.3	50.3 to 44.5

Source: Bureau of Labor Statistics, Twentieth Century Fund.

Short Week: Fact Vs. Fancy

We need greater productivity gains to justify sharp cuts in weekly hours. Even if labor forces reduction in straight time, we'll have to use more overtime to produce enough

EARLY April marks the official start of a campaign that will catch the bulk of the headlines on labor news in 1958.

Delegates to the United Auto Workers convention Apr. 7-12 in Atlantic City will vote to make the short week a major demand when the union negotiates new contracts with the auto companies next year.

Fervor—The campaign will reach the hullabaloo stage by January, 1958, when the UAW plans to call a special convention to drum up enthusiasm for the 1958 demands, mainly the short week. Remembering the tepid reaction of many of its members to the Supplemental Unemployment Benefit issue in 1955, UAW leaders are taking no chances this time.

They reason, probably correctly, that the short week will arouse more support than SUB because it's more easily understood, will benefit the entire membership rather than just those likely to get laid off and will bring higher wages because of more overtime.

Why?—The auto union is loading its big guns to demand a short week at a time when skilled labor is critically scarce and will probably remain so until the mid-1960s. The number in the work force will be adequate over-all, but just barely. Even by 1965, only 41.6 per cent of the total population will be available for work, a lower percentage than in 1950 and only slightly better than the 1940 figure.

Why the demand for less than 40 hours of work a week on straight time? The UAW likes it for three main reasons: 1. It's a readily dramatized issue. 2. It will mean higher wages through more overtime. 3. It will help spread the work if there is a slump.

Leisure—The union will argue, too, that it's helping a trend along. It's true that the work week has dropped. Working time in private nonagricultural activities declined by more than a third between 1850 and 1930—from an average of 65.7 hours a week to 43.2. Since 1900, the average decline has been a little more than 3 hours per decade. Vague is the word for the kind of short week the UAW wants, yet the 35-hour week is probably the least it's shooting for. Even that is a 5-hour drop from the present standard.

Do people want that much more leisure? The UAW claims they do, although it admits it has never taken a poll of its membership to find out. In the last 56 years, two-thirds of labor's gains have come in the form of wages and one-third in leisure. George W. Brooks, director of research and education for the Pulp, Sulphite & Paper Mill Workers, bluntly lists "increased take-home pay" as the top reason unions are fighting to cut the straight-time week. He candidly admits: "It's easier to bargain on hours than on wages." He analyzes the desire for leisure as only a minor factor in the drive.

Moonlighters—That the factor of leisure is not a major motivating force is indicated by the 3

Why the Work Week Won't Drop Abruptly

Labor force will grow . . . (millions)		But not as fast as population . . . (% of population)		Which will demand more goods, services . . . (GNP, billions of 1955 dollars)	
1965	79.2	1965	41.6	1965	$560
1960	73.2	1960	41.2	1960	475
1955	68.9	1955	41.8	1955	391
1950	63.5	1950	42.0	1950	322
1940	54.7	1940	41.5	1940	208
1930	49.3	1930	40.1	1930	165

Projections by STEEL. Other figures: Departments of Labor and Commerce.

million who today are moonlighters—people holding two jobs.

Organized labor is against moonlighting. So the UAW and others are putting a lot of ingenuity into a formula for the short week which will minimize the practice. The auto workers' director of research, Nat Weinberg, personally favors 8 hours a day, four days a week. Others want 6 or 7 hours a day, five days a week.

Longer Vacations—David J. McDonald, president of the United Steelworkers of America, is talking about an extra three-to-four month paid vacation every five years. Craft unions particularly are likely to favor this. Their skilled members are touchy about the issue because they aren't alarmed about layoffs.

A man who gets four weeks' vacation and seven paid holidays is actually working an average of only 35.6 hours per week each year, even when he's on a 40-hour, straight-time week.

40-Hour Rate — Whatever the form of the demand, all unions will want take-home pay at least to equal what they are getting under the 40-hour week. The UAW says it will ask for a short-week rate "substantially higher" than the 40-hour rate.

This pay issue is one of the reasons behind failure of the short week in Akron. The 6-hour day, six-day week in the Rubber City dated back to the depression when it was introduced to spread work. While wages rose with other rates around the country, the hours didn't. The United Rubber Workers last year negotiated to throw out their short week because their take-home pay was under that of workers with the same rates but getting 40 hours. They were also working six days a week rather than five.

Who Wants It?—Local 600 (at Ford) of the UAW is probably spearheading the short week issue. It wanted that instead of SUB in 1955. It won an agreement from President Walter Reuther to shelve the matter then, with the promise that it would be highlighted in 1958.

Significantly, 34 office employees of Local 600 started on a 30-hour week Feb. 11. Watch for other employees of the UAW to go on a similar schedule soon. The union will have to set an example before it can make the demand to the auto companies.

The Brotherhood of Teamsters says the 32-hour week will be its prime target when major three-year contracts expire in 1958. Many miscellaneous craft unions will drive for it.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

The Cost — The expense and other problems generated by the short week may be the greatest in areas where continuous operations

Conclusion

Average weekly hours will dip only a little by 1965

1965	37.0
1960	37.5
1957	39.0

So, each worker must turn out more goods, services

(1955 dollars)

1965	$7500
1960	6980
1955	6190
1950	5370
1940	4370
1930	3620

are needed, such as in many phases of steelmaking. A reduction to the 6-hour day in steel would cost the companies the equivalent of 94 cents an hour. A reduction of the work week from five to four days would cost 70.5 an hour. Even Mr. McDonald concedes that "is a lot of dough." He claims his long-vacation plan would cost only about 11 cents an hour.

In continuous operations, there is also the question of how to divide the work. A 24-hour day has to be broken into even multiples, making shifts of 8 or 6 hours necessary. The drop from 8 to 6 is 25 per cent. Various staggering arrangements in the number of working days can mean a less drastic reduction.

Higher, Higher—But it all adds up to higher expenses. Even the drop from 40 to 35 hours is a 12.5 per cent increase in labor costs. When equipment is used less in noncontinuous operations, you have to add the expense of idle machine time to your increased labor bills.

The exhibit on page 107 proves that sharp reductions in work time are justified economically only when they parallel sharp increases in productivity. It's no accident that a big drop in hours occurred in the 1920s. It was accompanied by dramatic gains in productivity. Henry Ford granted the 8-hour day after the boost in productivity, not before. Organized labor today can be accused of putting the cart before the horse.

We haven't had average productivity gains of 5.3 per cent annually since the 1920s.

Breakthrough?—Industry's most effective answer to the demand for the short week is a technological breakthrough that will boost productivity to such an extent that fewer hours will be economically possible. Automation may be the answer eventually. Some observers cite the late 1960s as the time when we can economically reduce hours. But in the meantime, what does industry do? The demand is coming next year, not in the late 1960s.

A few management men advise accepting the inevitable. "In a year, the shorter week will start sweeping the country," predicts Frank Kelly, president of KelStrom Tool Co., Wethersfield, Conn. The firm has granted 40 hours' pay for 35 hours' work to its 100 nonunion employees making aircraft tools and test equipment. It pays time and a half over 35 hours and is now operating on 50-hour week.

Not for All—Not every management can afford such a setup. Some economists have talked about an escalator clause for hours similar to the one we frequently have for wages. As productivity climbs according to an agreed-upon schedule, hours decrease but pay holds at the 40-hour level. Many management men favor longer vacations as the most practical way to reduce average weekly hours. To minimize fears of unemployment, some propose modifications to existing SUB plans to provide for separation or dismissal pay.

Sumner Slichter, Harvard economist, points out some possible compensations of the short week: "In some industries, it may make possible more extensive use of two-shift operations with more intensive use of plant and equipment. In some cases, the demand may give management an opportunity to negotiate a revision of loose standards and the elimination of make-work practices, so that almost as much output can be obtained in 35 or 36 hours as in 40."

Conclusion — But he also believes: "Employers should begin studying the effect of a shorter week months in advance of negotiations. In some cases, it can also require management to add more men and equipment—obviously an expensive step and one to avoid if at all possible."

Not many segments of industry are ready for the short week. By 1965, our labor force won't be able to make all that the population needs on a 30 or 32-hour weekly schedule. Some unions may force the reduction in straight-time hours. But the total average weekly time worked won't drop much below 37 hours by 1965.

11.5 Million Changed Jobs in '55

One in seven of the 75 million persons employed in 1955 changed jobs during the year, the Census Bureau reports in a special labor force study.

One in four workers between 18 and 24 years old changed jobs. Among those between 35 and 54, the ratio fell to one in seven. Men changed more than women and also had a greater tendency to hold two jobs at the same time.

Steel Payroll Tops $3 Billion

Payroll for the iron and steel industry in 1956 hit a record $3,795,975,000. This is nearly $200 million higher than it was in 1955, according to an estimate of the American Iron & Steel Institute.

Average hourly payroll cost for wage earners was higher than ever before at $2.70. (This does not include the average cost of about 25 cents per hour for fringes.)

During 1956, the industry's employment was estimated at 653,400, a 4000 dip from 1955's. Wage earners worked an average of 38.6 hours per week.

Small Firms Eye Computers

You don't have to be big to streamline operations with the electronic marvels. Most equipment is available on service, rental or outright purchase basis

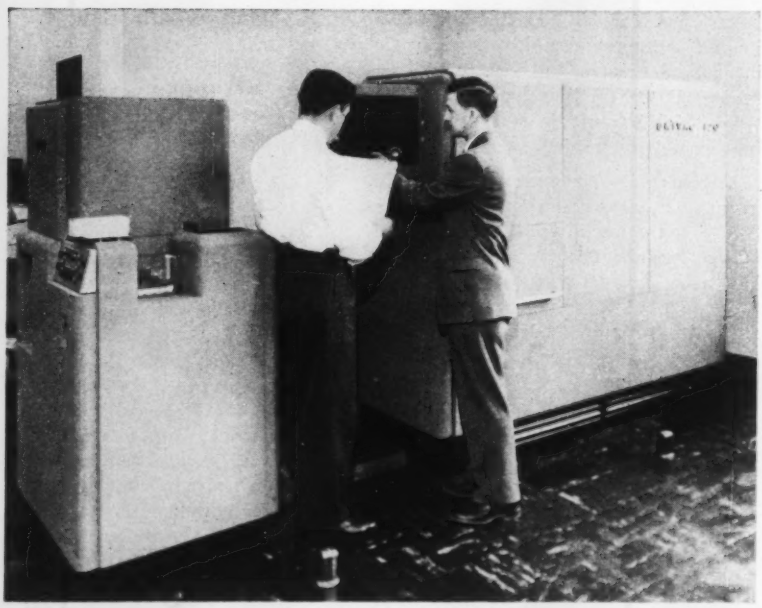
ELECTRONIC computation is no longer largely the preserve of big business.

Available—Small firms are using the service on an hourly or fixed price per problem basis. Some are in a position to lease or even buy the lower cost equipment that is being developed.

Many applications of big companies are equally feasible for small companies, including inventories, payrolls, various accounting chores and scientific, engineering and statistical work.

Cost—Equipment charges vary. But this will give you an idea of costs: International Business Machines Corp.'s most inexpensive calculator, the 602A calculating punch, rents for $245 a month and sells for $15,900. The unit is electromechanical, not electronic, although it has been used successfully on a wide variety of business problems. The company's most inexpensive electronic calculator, the 604 calculating punch, rents for around $550 a month and sells for $33,850. Remington-Rand Division of Sperry Rand Corp. rents its Univac 60 for $690 a month and sells it for $75,000. Its Univac 120, which has twice the capacity of the 60, rents for $1000 a month.

Some of the latest small electronic equipment is designed largely for engineering and scientific work. Within limits, these computers, such as Burroughs Corp.'s E101 and Royal McBee Corp.'s LGP-30, do much the same work as their bigger "brain" brothers. They usually rent for $1000 to $1100 a month and cost $35,000 to $40,000. Training time for operators runs two weeks and less. One computer manufacturer claims that a man with "only a touch" of engineering can learn to handle his equipment within four days. Training for the medium sized electronic computers runs three to four weeks.



Small firms can rent time on computers like this Univac 120 in Cleveland

Wade Before Swimming—Most small firms find the best approach to electronic computing is through the service organizations. This gives them a chance to see what can be done to solve their problems and whether the cost is worth the results. Some, as one service operator puts it, "prefer to get their feet wet before taking the plunge" and laying out larger sums for rental and purchase. Service organizations will generally evaluate a company's problem without obligation but they do charge for the actual programming.

Many data processing men believe small business should enter the field (particularly for accounting work) in the same fashion as the big companies—start with a relatively simple, inexpensive punched-card system. According to Remington-Rand many small firms using this equipment have broadened their data processing systems by installing punched-card electronic computers or have hired "time" on computers made available in service bureaus by suppliers of their punched-card machines.

IBM says the great volume of work done for small business today is in inventory and payroll. "But in small company computing we are still talking futures, for the most part." This company regards the market for small, desk computers as "tremendous."

Smaller the Better—Two recent developments at IBM will aid in the development of small computers. The company says: "First, there is miniaturization, smaller electronic components. The transistor is all important. It reduces the size of a computer and obviates air conditioning because it replaces the vacuum tube. Printed circuitry is another factor."

Second, there is the IBM random access memory equipment, announced last fall, which does away with "batching," making it possible to bring all figures, as processed, up to date. But these machines are expensive (the smallest, the 305 RAMC, rents for $3200 a month).

Flexibility of operations enables Harris Calorific to compete with big firms

Small Firms Can Compete

Harris Calorific, welding and cutting apparatus maker, finds smallness an advantage in competing with giants. Harris sees a 15 per cent rise in its sales this year

A PREDICTED sales increase this year and a 30 per cent gain last year underline Harris Calorific Co.'s contention that the small company has some inherent competitive advantages.

The Cleveland firm employs about 150 and has about a dozen competitors in the manufacture of welding and cutting regulators, torches, tips and manifolds.

About 60 per cent of a market estimated to be worth about $30 million is scooped up by the top three firms. Harris Calorific's share is 8 per cent. The firm has made good profits despite one advantage of its bigger competitors. They also sell welding gases. This provides them with a readymade list of equipment sales prospects.

How To Compete — Obviously, says Harris Calorific's president, Clarence M. Taylor, a company must have a good product and provide good service. If the small firm is competitive, many companies (often large ones) prefer to do business with it.

Reasons: 1. They like to deal with top executives when problems arise. 2. They prefer a company which can move quickly on special requirements.

Profit Making—Mr. Taylor says: "We watch design closely to prevent any waste of material. (The company's products are made largely of brass.) And, we spend a lot of time in tooling."

Mr. Taylor credits employees with keeping costs competitive. He believes they are conscientious about costs because it is easy for them to see that their jobs depend upon their company's success.

The challenge of big-company automation doesn't frighten Mr. Taylor. Reason: Costs for tooling are high and only standard products can be made. Harris Calorific concentrates on improvements which do not impair its flexibility. Soon to be installed is a storage system which will bring a worker the parts he needs at the press of a button.

Research—Harris Calorific does its own development work, but farms out basic research. Currently, the company has Rand Development Corp., Cleveland, working on two projects. This arrangement gives its development engineers access to the research organization's facilities.

Sales — The company sells through distributors. Until recently, most of them were in northeastern U.S.

But district managers have been employed to develop additional distributors and provide technical service throughout the nation.

The desire of multiplant companies to standardize on one maker's products gave Harris the push to expand its operations. Mr. Taylor believes that in his company's business "at least a national distribution is needed." The company has a sizable export business; it ships to 24 foreign nations.

Rust-Oleum Doubles Output

A $500,000 addition to the Rust-Oleum Corp. plant in Evanston, Ill., will double the capacity of that facility.

Job Shop Surveys Market

A report by Worcester Pressed Steel Co. reveals a majority of users plan to purchase as many or more stampings than they have in the past

Now . . . **43.5% buying as many units as they did in 1954 (a bad year).**
34.8% buying at least 15% more.
21.7% buying less.

Future . . . **42.2% will buy as many as they did in 1954.**
38.9% will buy more.
18.9% will buy less.

But . . .

87.8% plan to use more units (bought and made) than in 1954.
12.2% plan to use fewer units.

DESPITE the tendency of some users to make their own stampings, job shop prospects are good.

In a survey of users of precision stamped products, Worcester Pressed Steel Co., Worcester, Mass., found 78.3 per cent are buying as many or more units than they did in 1954 (a poor year for stampings); and 81.1 per cent plan to buy as many or more units in the future.

The nation has 2200 stampers, but the ratio of independent to captive shops is hard to ascertain because statistics are hazy on this point, said Carter C. Higgins, president of Worcester Pressed Steel.

Big, But — "Automobiles frequently account for 40 per cent of all stampings produced," Mr. Higgins continued, "and we had no way of analyzing plans of the Big Three (who fiercely guard such information from their competitors), so our questionnaire left a big gap of hundreds of millions of dollars unanswered."

Findings—Those who make their own stampings submit these reasons: 1. They have better control of quality. 2. Stampings cost less. 3. They have a larger base for overhead. 4. Inventory control is better. 5. Delivery is better. 6. They can meet specialized needs easier.

Those who are buying more stampings maintain: 1. It's cheaper to buy. 2. They lack facilities. 3. Outside tooling costs are cheaper. 4. Overhead is lower.

Divided—"There is no unified opinion that it is more economical either to make your own stampings or to buy them," Mr. Higgins said. "If we include 'cheaper to buy' sentiments of those making none, opinion is equally divided in this survey.

"While the last two years have shown a definite trend toward stamping users making more of the parts they use," he added, "it appears that over half the nonautomotive companies replying now plan to buy more stampings, with less than a quarter planning to decrease their purchases. These plans should be weighed against the projected needs of an increasing population living better."

Yugoslavia Lags

She wants our technical assistance. We should provide it, says stamper

ANOTHER U.S. industrialist has taken a close look at metalworking in eastern Europe (STEEL, Nov. 19, 1956, p. 102). Jack Kleinoder, general manager, Volkert Stampings Inc., Queens Village, N. Y., visited Yugoslavia.

Observations — Industrial development there lags 15 to 30 years behind the U.S. Machine tools being built compare roughly to our prewar models. Mechanized material handling operations hardly exist. Productivity per worker is low because of inadequate equipment and outdated methods.

Mr. Kleinoder returned from Yugoslavia believing Soviet Russia, too, has a long way to go before matching our machine tool production and engineering efficiency.

Conversations—As a member of a four-man Department of Commerce trade team, he talked with engineers at the Russian pavilion at the Zagreb trade fair. Twenty modern machine tools were displayed, but only three were in production and available on the open market.

Given a choice of technical assistance from Russia or the U.S., Mr. Kleinoder concludes most Yugoslavs would prefer the U.S. They would also prefer U.S. money to Russian because fewer strings are attached.

Recommendations — He favors trade between the U.S. and Yugoslavia on a limited basis. The country is generally alert to Western ideas; Mr. Kleinoder concludes that more Yugoslavs should be encouraged to visit the U.S.

Dana Expands Division

J. E. Martin, president, Dana Corp., Toledo, O., says a multimillion dollar expansion has brought a 40 per cent increase to automotive frame production at the firm's Parish Pressed Steel division at Reading, Pa. Manufacturing space has been increased 185,400 sq ft.

This prefabricated open hearth is ready to be transferred to its foundation

Geneva Works Expands

New method of enlarging open hearth furnaces reduces down time. Completion of U.S. Steel program late this year will boost capacity of this facility 20 per cent

U.S. STEEL Corp.'s expansion of the Geneva (Utah) Works of its Columbia-Geneva Steel Division has been speeded by a new technique of rebuilding and enlarging open hearth furnaces.

Usual down time for furnace rebuilding had been as much as 30 days. Lawrence F. Black, general superintendent of the Geneva Works, says the new method held it to about 16 days.

How It Works—Furnaces were prefabricated outside of the open hearth shop and moved into place as a complete package.

Seven of the ten Geneva furnaces were rebuilt and enlarged to 300-ton capacity in this manner: Steelwork was completed outside the shop; furnaces were placed in position; then brickwork was installed.

Earlier, two furnaces were rebuilt conventionally.

Extra Fast—The last furnace to be rebuilt (it weighs 1850 tons) required only 11 days down time. Even the brickwork (33 carloads) was completed outside. It was moved 900 ft into a cross transfer position.

To simplify transport into the shop, the furnace was constructed on six ingot mold cars mounted on three sets of tracks (see photo). An erection platform was installed on the cars. (Further details of the move will appear Feb. 25 in STEEL.)

More Growth—To handle the increased heats of steel from the furnaces, auxiliary equipment, such as cranes and ladles, is being added.

Three 300-ton pit cranes will be rebuilt and enlarged to 450-ton capacity.

When the program is completed late this year, Geneva's annual rated capacity will reach 2,262,000 tons.

Improvements — A multimillion dollar program (improvements and additions) is planned for the division's coal properties in Utah.

Featured, says L. R. Wellington, division president, is a coal cleaning plant which will handle 600 tons an hour. To be built near Wellington, Utah, it will reduce ash and sulphur content to provide a better coke yield and blast performance at the Geneva Works.

Granite City Steel Expands

Granite City Steel Co., Granite City, Ill., plans to spend $18.5 million this year to complete major portions of its $36.5-million expansion program. When it is completed by the end of 1958, Granite City expects to have an annual ingot capacity of 1,584,000 tons—it's now 1.2 million tons.

Major projects included in this year's plans are a sintering plant for the processing of low grade ores, redesigning of open hearth furnaces, addition of a new oxygen plant, new soaking pits, additions to the cold strip mill and annealing department and a new water system.

Link-Belt Builds Near L.A.

Link-Belt Co., Chicago, will replace and expand its facilities in Los Angeles with a new plant in Montebello, about 10 miles east of downtown Los Angeles.

The 90,000 sq-ft plant will more than double Link-Belt's manufacturing facilities in the area.

The plant is expected to be in operation by November.

More Steel Used in U.S. Aircraft

A REVOLUTION is quietly taking hold in the aircraft industry. New fighter planes are 70 to 75 per cent steel, compared with the conventional 15 to 20 per cent. Bombers are following the same trend. Such planes will replace present aircraft inventory within ten years, predicts Brig. Gen. Clyde H. Mitchell, deputy director of production, Air Materiel Command. So, he says, "extremely large" quantities of nickel and chromium (in stainless steel) will be demanded by the aircraft industry in coming years.

New Alloys Will Beat Temperature

Other trends to watch in aircraft and missile metals: Among materials being looked at for sustained heat applications (2000 to 2500°F) two seem to be the best bets: Molybdenum (if coatings can be developed to prevent oxidation) and ceramics. Boron is making for improved alloy steel (the Air Force is also interested in it as a basic material for high energy fuels). Beryllium has promise as a structural material if supply problems and its inherent brittleness can be overcome. Titanium with a high vanadium content is looked on as an improvement over present alloys. New magnesium alloys can be used at 700°F and are 30 per cent lighter than general-use aluminum alloys whose strength fades at about 325°F.

Coming: More Investigations

The present (85th) Congress is acting as if it intends to upset the "investigatingest yet" record of its predecessor. Much of the probing can be viewed as a natural result of a Democratic Congress vs. a Republican administration: Politicking. The Democrats are trying to make a record for the 1958 elections to head off a looked-for Republican do-or-die effort to regain control of Congress. Another reason: Present hue and cry about inflation.

Steel, Autos and Labor Are Next

Already in the works are checks on price increases (oil will be the first). Some time in March the Joint Economic Committee will trot out its long-in-the-gathering material on prices, profits and wages. (Work on the President's economic report will keep it tied up until then.) Steel will be a prime candidate for attention then. Within the next two months, Sen. Estes Kefauver's (Dem., Tenn.) antitrust and monopoly subcommittee will wind up data collecting on economic concentration in major U.S. industries. Autos (particularly General Motors Corp., it's said) are likely prospects as are such varied fields as oil, newsprint and meatpacking. On the other side of the fence, talk is growing that labor will get a thorough going over in a continuing investigation.

Machine Tool Report Due Soon

Another probe to watch for is on government machine tool buying. The Senate Small Business Committee is miffed over the failure of the Pentagon to break tool buying plans out of its budget. A report is expected in about a month, but the committee isn't optimistic over its prospective content, and may hold hearings to get more information.

Tax Relief Is Far Away

Outlook for small business tax relief is dim. Even the weekly staff report of the Senate Small Business Committee admits it. Prime factor is the administration's strong stand against tax changes that would mean substantial loss of revenue. Another: House Ways & Means Committee action which apparently paves the way for continuation (with no changes) of present corporate and excise rates. Small business proponents see their remaining chances for action this year in bills that would graduate the corporate tax structure—those they say would give small business relief without loss of federal revenue.

More REA Electricity

Almost $1 billion will be spent in the next five years by electric systems that borrow from the Rural Electrification Administration.

Meet Raymond E. Hebert: He'll head Water & Sewerage Industry & Utilities Division, Business & Defense Services Administration, for the next six months. Mr. Hebert is on leave from his duties as President of Filtration Equipment Corp., Rochester, N. Y. Contact him in Washington at Commerce department, room 4069. Phone STerling 3-9200, ext. 3262.

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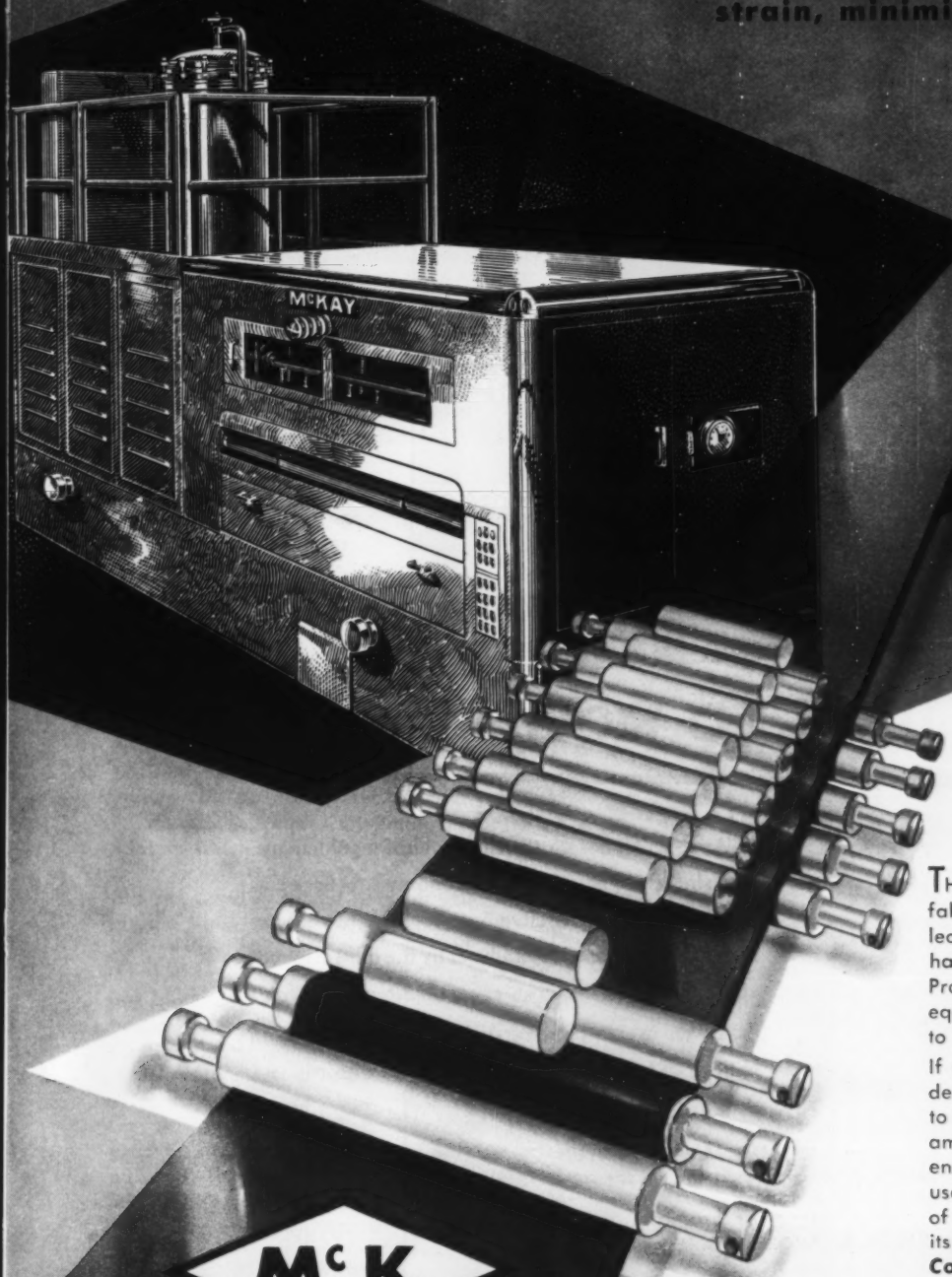

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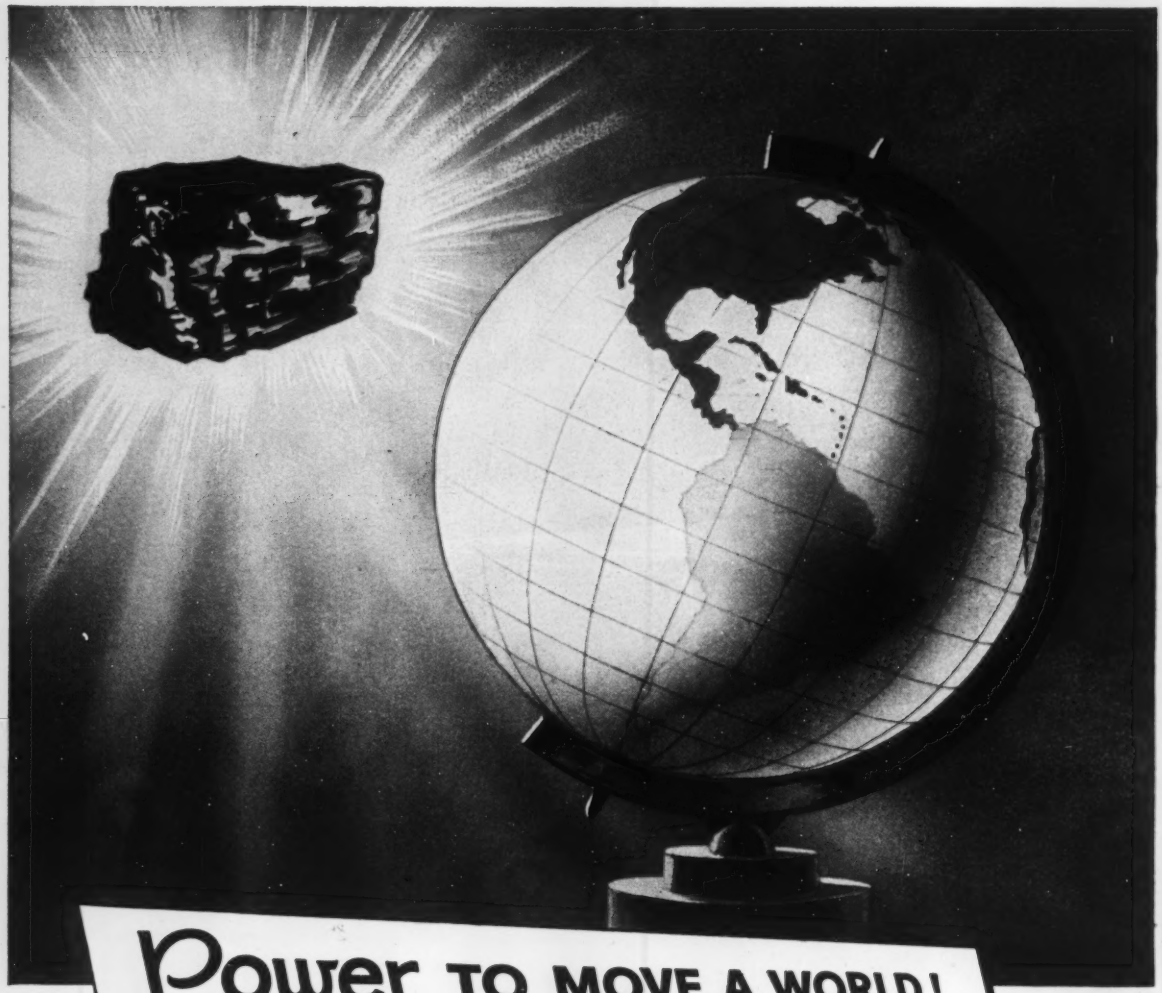

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Aluminium's West Develops U.S. Market

"WE FACE the problem of how to better develop the U.S. market," says Eric F. West, president, Aluminium Ltd. Sales Inc. (Alsales), New York.

As president of the sales subsidiary representing Canada's primary aluminum producer (Aluminium Ltd.), one of Mr. West's primary goals is to prove to potential U.S. customers that his organization must develop the American market as a key customer—Canada uses only 15 per cent of Aluminium's annual production. Alsales hopes to improve its 12-year sales record in this country by selling about 40 per cent of the parent company's primary production in the U.S. during '57.

How—"We are bucking the trend toward diversification by being specialists in one area—the use of aluminum ingots," he explains. "This gives us a valuable sales tool because we can point out that we do not compete for the end-use market with the U.S. independent fabricator."

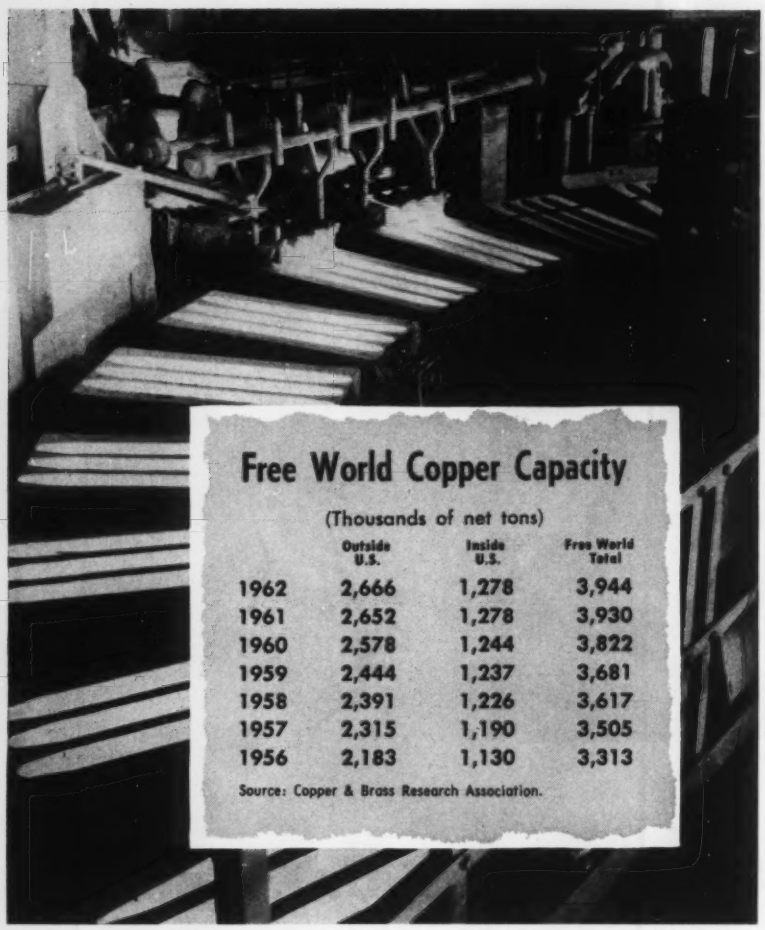
Continues the 33-year-old, New England-born president: "While we are delivering substantial tonnages of ingots on a contract basis to Kaiser Aluminum & Chemical Corp. and Aluminum Co. of America, our sales growth must come from independent users (sheet and foil makers, die-casters, extruders, foundries)."

Approach—Selling the independent calls for a specialized program. "Most of our salesmen have strong economic and business administration backgrounds rather than engineering degrees," he reports. Alsales representatives must be able to determine if a small or medium-size independent fabricator is on a firm foundation before trying to sell the potential customer on the advantages of purchasing capital equipment (extrusion presses, die-casting machines).

Some of the questions salesmen must answer: 1. Will this move increase the money-making potential of this customer? 2. Can the equipment be amortized fast enough so that the independent does not tie up too much working capital? 3. Even though the company is small, is there sufficient depth of management?

Technical Aid—"Our development staff must carry the load so far as being alert to new types of machines and developments in the equipment field," says Mr. West. "Our sales force must have sufficient management and economic background to understand and develop the steady, long range independent aluminum user who is becoming our life blood."

Outlook—During 1956, Alsales sold over 250,000 tons of aluminum ingots in the U.S. This year's shipments should top 280,000 tons.



Free World Copper Capacity

(Thousands of net tons)

	Outside U.S.	Inside U.S.	Free World Total
1962	2,666	1,278	3,944
1961	2,652	1,278	3,930
1960	2,578	1,244	3,822
1959	2,444	1,237	3,681
1958	2,391	1,226	3,617
1957	2,315	1,190	3,505
1956	2,183	1,130	3,313

Source: Copper & Brass Research Association.

Molten refined copper is being cast into wire bars

Copper: More Stable in '57

Uncertain labor conditions in Rhodesia and Chile could still mean trouble, but odds are reasonably good that the red metal's price will gyrate less this year than last

NO COPPER shortage will plague industry this year, world labor willing.

Three-year labor contracts in the U.S. assure uninterrupted production. Chile has signed its contracts for pay and fringe benefits for '57, but the government-controlled mines are subject to that country's economic and political outlook. The Rhodesian mines, with their constant racial problems, could be a trouble spot.

World Market — Domestic users are forced to look at copper on a world-wide basis. The U.S., with some 6 per cent of the world's population, consumes almost 45 per cent of the world's production. We must import about one-third of our supplies.

Free World capacity stands at about 3.5 million tons annually, estimates the Copper & Brass Research Association (CABRA). By 1962, world refined production should swell to almost 4 million tons. World refined production just missed 3-million-ton mark in 1956 (2.99 million tons). U.S. share: 1.58 million tons.

Mixture—Despite justified complaints about poor business from brass mills in the second half and the rapid fall of prices, the copper industry recorded its most profitable year in 1956.

Example: Kennecott Copper Corp. estimates its net income in 1956 was $142.6 million, an increase of $17.1 million over 1955 record results. While its copper sales dropped from 533,820 tons in 1955 to 495,214 tons last year, the average price in 1956 was 41.6 cents per pound. During 1955, it was 36.6 cents.

1957—The copper industry faces its most competitive year. Producers will compete more fiercely with each other (price shading is already reported), and other nonferrous metals will continue to try to take away some copper markets. But price stability and the development of more specialized uses can help bring in a peak year.

Prices — Domestic and world prices may be heading for about the 30 cent a pound mark. On Feb. 1 Phelps Dodge Corp. initiated a price reduction which brought primary copper down from 36 to 34 cents a pound. Kennecott and Anaconda Co. followed. U.S. custom smelters will tend to sell at 1 to 2 cents under the primary quotation as long as supply exceeds demand.

What It Means — If copper makers can convince users there will be an adequate supply at a reasonable price, they may be able to beef up sales. Gyrating prices caused many design engineers to specify other metals last year. The catch: Price stability can be maintained only if all world mines continue producing. A serious strike in Chile or Rhodesia would send foreign quotations skyrocketing.

There are many estimates of what constitutes a "reasonable price." Ronald L. Prain, chairman and president, Rhodesian Selection Trust Ltd., reports: Based on 1955 statistics, it can be said that 20 per cent of the world's copper is produced at less than 10 cents a pound; about 66 per cent, below 20 cents; and around 90 per cent, below 25 cents.

Applications — The greatest

growth area is in the fast moving electrical, electronics and atomics fields. Phelps Dodge reports that it is having success in serving the specialized needs of these industries. Examples: It has developed a magnet wire which has helped solve the problem of winding yoke coils for TV sets. It also has concentrated on developing coaxial cable which can be used to transmit information from the site of atomic and hydrogen bomb explosions to recording devices before the cable is destroyed by the explosion.

Another growing field: The use of special oxygen-free copper extrusions in atomic accelerators.

Foreign Impetus — Points out a sales manager: "While the U.S. per capita use of all grades of copper is about 18 lb, Free World per capita use is only about 3 lb. But with the development of atomic reactors, countries which formerly had no power source for heavy industry will now be able to produce their own mill products. This should bring about a growing foreign demand for copper."

New Approach — Diversification is being greeted with mixed emotions by the copper industry. Some companies are expanding into the fabrication and/or production of aluminum, zirconium, molybdenum, columbium, tantalum and titanium. Others will continue to concentrate on the development of new and better uses for the red metal.

Brass Mills—Captive and independent mills will turn more toward being suppliers for both aluminum and copper products. Some are experimenting with titanium and doing intensive research on how to produce zirconium mill products.

In Retrospect — With dropoffs in automobile production, appliance demand, new housing starts and military orders, brass mills experienced a turbulent second half last year. January and February demand has been far from excellent, and imports are getting to be a threat. This may cause more pressure to be placed on primary producers for a revamped pricing system. As it stands, Chilean production is being sold to other than American sources on long lead time contracts. Price is based on the monthly average of such organizations as the London Metal Exchange. American mills are restricted to about a 30-day basis. The price is based on "date of shipment" quotations. During 1956, Chile produced some 443,166 tons of electrolytic, blister and fire refined copper. Anaconda and Kennecott-operated mines produced all but about 45,000 tons of the total.

Brass mill outlook: Users will hesitate to enter the market for more than enough tonnage to cover week-by-week needs as long as prices are falling. With reasonable assurance of continued good supply, inventory building will not affect '57 sales outlook. Bright spot: If the market stabilizes at about 30 cents, look for an upsurge in brass mill orders. That price will make fabricated copper products more competitive with their biggest rival — aluminum.

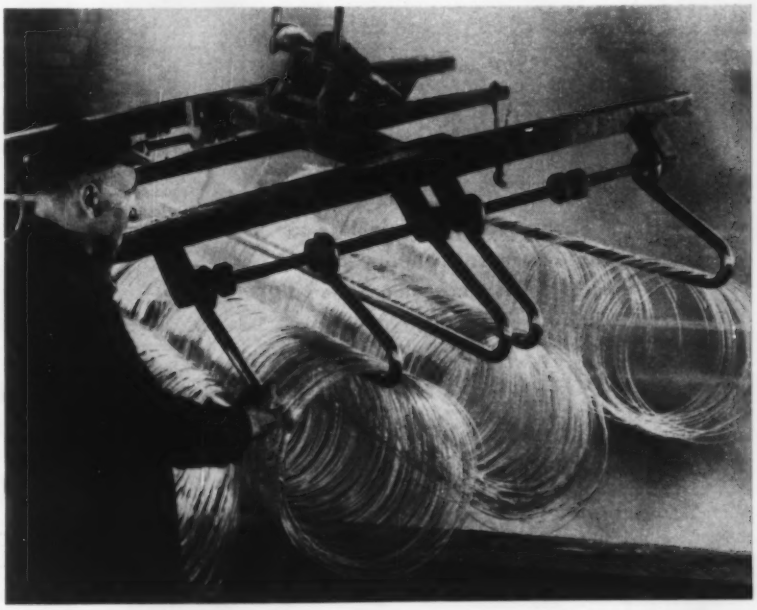
Adds Herbert Barchoff, president, Eastern Rolling Mills Inc.: "With a stable realistic price, the consumer will have more confidence in incorporating the red metal into his design plans again. Copper is suffering from a hangover caused by the runaway price binge it indulged in last year. There must be a stable price structure."

Reports I. J. Louis, manager, metal department, Bache & Co.: There are two reasons why foreign mills can undersell the domestic fabricators. One is cheap labor, the other the lower price at which foreign fabricators can buy copper.

Imports—Even with tariffs in effect, CABRA estimates (based on imports and domestic brass mill shipments combined) that imports are accounting for 5.3 per cent of seamless copper tube shipments; 6.8 per cent of copper sheets; 2.1 per cent of copper rods; 3 per cent of copper-base alloy rods; 14 per cent of copper-base alloy seamless tubing.

Outlook — Primary producers will have a good-to-excellent year. Record cable and wire shipments will help assure this. Secondary producers and brass mills will have to sell hard, but should come up with a profitable year. The government may rekindle its interest in copper for strategic stockpile if the price drops to 30 cents a pound. Industry confidence will remain unshaken. Case in point: Anaconda Co. has committed itself to a $350-million expansion program to be completed by the end of 1961.

Says one copper man: "Most news media have predicted our final hour for the last four years. Yet each year has been successful —some even setting records. If this is doom and the end, I like it."



Pickling gives copper or copper-base alloy wire an oxide-free finish

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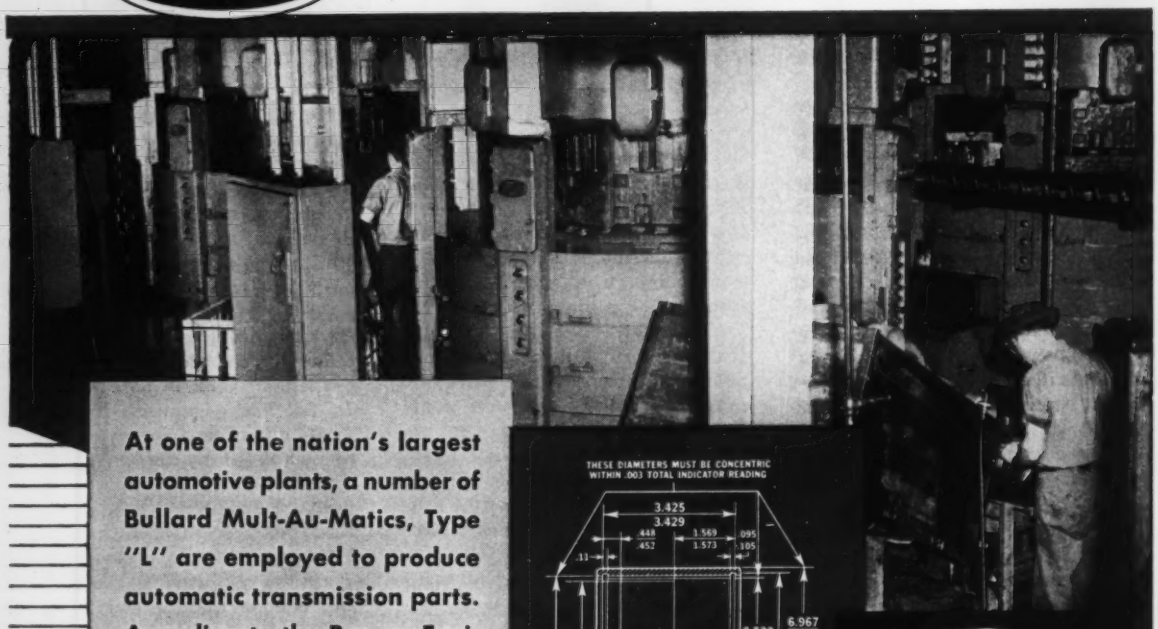
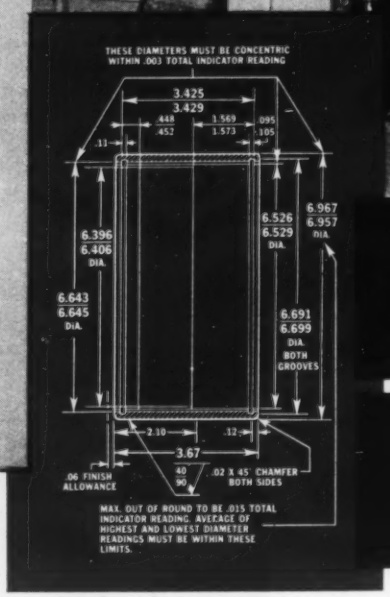
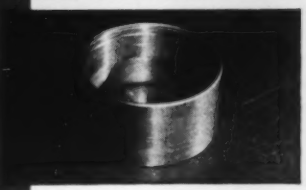


At one of the nation's largest automotive plants, a number of Bullard Mult-Au-Matics, Type "L" are employed to produce automatic transmission parts. According to the Process Engineer "The transmission is the most precision piece of equipment in the entire car — with many moving parts fabricated to close tolerances."





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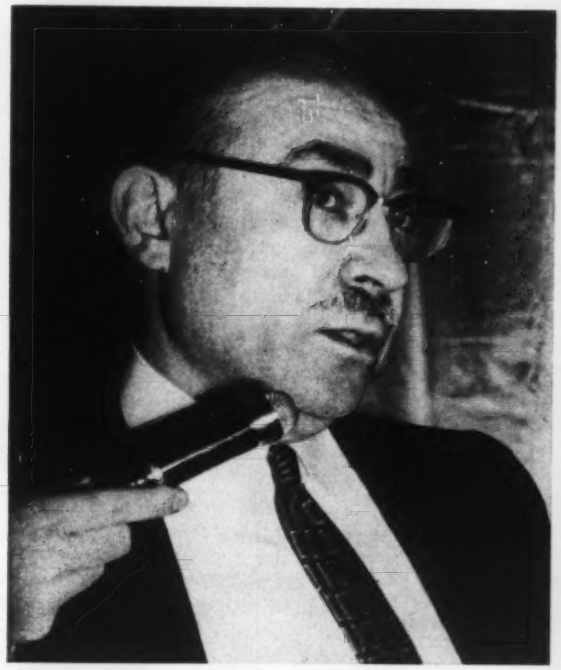

CHALLENGER SOL. A. DANN

AMC's RICHARD E. CROSS

American Motors may face a stockholders' battle as . . .

AMC Answers Mr. Dann

AMERICAN MOTORS Corp. reports it lost $3 million on sales of $88.9 million in the first quarter of its fiscal year ending Dec.31, 1956.

Last year, the company had an operating loss of $4.6 million for the same period. Sales were $99.1 million.

This information was revealed at AMC's annual stockholders' meeting earlier this month in Detroit. Richard E. Cross, company director, acted as chairman in the absence of George Romney, president.

Sol A. Dann, Detroit attorney who holds 900 shares of AMC stock, criticized management for keeping the company in the red.

Rebuke—He challenged the size of management salaries and said the firm should diversify its products so it could make a profit and pay a dividend.

Mr. Cross said: Since the 1954 merger with Nash-Kelvinator and Hudson, the company has been moving constantly toward a stronger position by getting rid of useless plants and by developing new products.

No Dividends — "These things brought a reduction in working capital, and American Motors will be in no position to resume dividend payments until its earning ability has been restored," retorted Mr. Cross.

He pointed out that AMC's bank credit program carries a provision against paying dividends at the present time.

Salaries—Prior to the merger, salaries of Hudson and Nash-Kelvinator officers and directors averaged $48,511. AMC executive salaries averaged $32,981 in 1956, continued Mr. Cross.

Another stockholder was ruled out of order when he questioned Mr. Cross's objectivity in representing both management and stockholders.

Onslaught—The Detroit attorney then launched an attack on company management. He presented eight suggestions which he claimed would put the firm back on a paying basis.

Among them: A reorganization of management; discontinuance of the Nash, Hudson and Metropolitan lines; closing down AMC's Milwaukee body plant; and concentrating on Rambler production in Kenosha, Wis.

Mr. Dann also suggested that the company should study the pos-

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sibility of manufacturing truck trailers.

Expense accounts of officers and directors should be scrutinized, he added.

If management ignored these proposals, Mr. Dann concluded that the company should try to effect a merger.

Rebuttal—Mr. Cross previously had said the company has been open minded about the possibility of a merger but that a recent study by an investment banking house advised against it at the present time.

In a separate report, Roy Abernethy, vice president of automotive distribution and marketing, said Rambler sales in January were 14.5 per cent ahead of those at the same time a year ago.

"Nash, Hudson and Metropolitan sales are showing gains over the previous month's," he added.

Join Hands—At the conclusion of his speech, Mr. Dann suggested that stockholders who felt as he did would be welcome to attend a meeting of dissenters at the plant or elsewhere.

Some 11 stockholders, several of whom had joined in criticizing the company, met with Mr. Dann. It was observed that they seemed to be well acquainted with each other.

Mr. Cross earlier stated that of the 48,000 stockholders, 600 have indicated they would like to be represented by Mr. Dann.

This is the Detroit attorney's first crack at AMC, although he showed up in the role of dissenting stockholder at Studebaker-Packard's annual meeting last year.

Car Builders Report

Chrysler Corp. reports net earnings of $19.9 million on sales of $2.7 billion in 1956, says L. L. Colbert, president.

Profits were down to $2.29 per share, compared with $11.49 in 1955.

Mr. Colbert cites lower demand, extensive tooling and design costs for 1957 cars as factors contributing to the decline in earnings. He looks for an improvement this year.

"In response to rising demand and retail sales performance of our 1957 models, our assembly plants are scheduled to build one-third more cars in the first three months of this year than they did in the same period last year," he adds.

Chrysler's production is running close to 20 per cent of the total automotive market.

The company's defense sales dropped to $165 million of total business during '56. In 1955, they were $195 million, Mr. Colbert reports.

Ford Income—From Dearborn, Mich., Henry Ford II announces Ford Motor Co. earned $236.6 million on sales of $4.6 billion last year.

Although this is a drop from the record performance in 1955, it is the second best year in company history, declares Mr. Ford. Earnings per share amount to $4.38, compared with $8.19 in 1955.

Hourly employees earned an average of $2.48 an hour, vs. $2.42 in 1955, adds John S. Bugas, vice president of industrial relations.

Ernest Breech, chairman, announced Ford will spend about $710 million for facility expansions in 1957.

Exhaust Notes

• A modern scrap handling and baler system will be installed in GM's Fisher Body stamping plant in Cleveland, reports G. J. Bates, plant manager.

• Studebaker-Packard Corp. now offers its nonslip differential as optional equipment on the Studebaker Champion series.

• S-P also has developed a can-shaped oil filter which motorists can install. It replaces a cartridge-type filter.

• Frederick M. Sutter, Columbus, Ind., succeeds Carl E. Fribley as 1957 president of the National Automobile Dealers Association.

• Vauxhall Motors Ltd., GM's British subsidiary, announces a Vauxhall car called the Victor. Philip Copelin, managing director of Vauxhall, suggests the car will be built for export as well as home consumption.

• Lee F. Desmond, Dodge vice president in charge of sales, reports the division has already received 1220 orders for cars equipped with air conditioning. Only 1332 air conditioned cars were ordered from Dodge during all of 1956.

• This year's sales goal for American Motor's Metropolitan (small runabout) is 20,000 units, states James W. Watson, Metropolitan sales manager.

• Detroit has been named as the port of entry for English built Ford cars, reveals Ford's International Division, Foreign Products Branch.

• Willys-Overland Export Corp. hopes to increase sales of vehicles, parts and equipment 26 per cent in 1957. J. C. Delaplain, vice president and general manager, says the corporation will ship more than 40,000 vehicles overseas for an estimated sales volume of $60 million.

• An antifriction metal powder which can be sprayed on crankshafts has been developed by Wall Colmonoy Corp., Detroit. The material is a high chrome-nickel powder containing chromium borides. It's called Colmonoy C-250.

• Republic Aviation Corp.'s XF-103 is the closest yet known to an all-titanium aircraft. But it's only an experimental job, not likely to get into production—one of numerous Air Force-aircraft industry approaches to the heat and other problems of supersonic flight.

U.S. Auto Output

Passenger Only

	1957	1956
January	642,090†	611,190
February		554,667
March		575,559
April		547,766
May		471,994
June		430,141
July		448,804
August		401,997
September		190,709
October		388,922
November		581,088
December		597,083
Total		5,799,920

Week Ended	1957	1956
Jan. 12	147,129	149,995
Jan. 19	145,761	144,729
Jan. 26	145,191	135,586
Feb. 2	140,411	140,582
Feb. 9	146,966†	136,308
Feb. 16	147,500*	128,324

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

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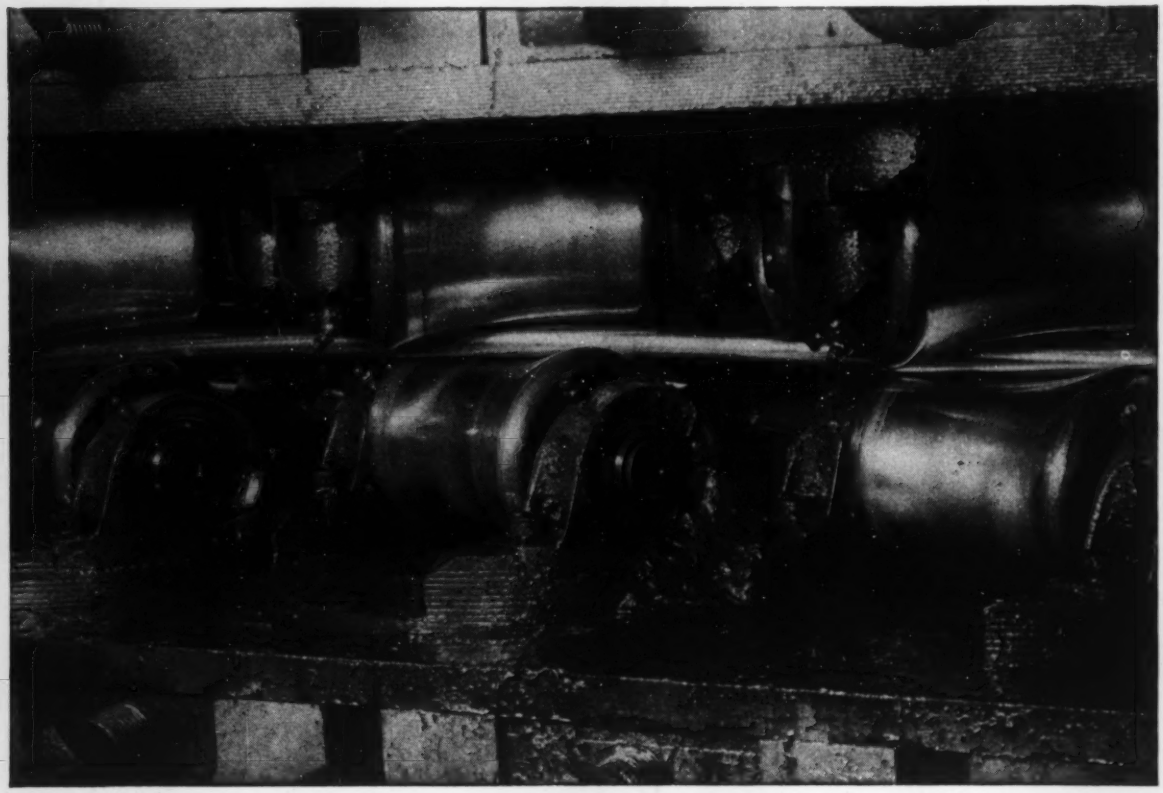

Uses tool steel that outwears others 3 to 1 for its straightener rolls

TO help its customers get the longest possible life out of the rolls used in its small tube straighteners, Mackintosh-Hemphill Division of E. W. Bliss Co. makes them from Graph-Mo® steel.

Graph-Mo contains millions of tiny particles of diamond-hard carbides. As a result, users report it outwears other tool steels on an average of three to one!

Graph-Mo steel also contains free graphite which gives it outstanding anti-friction properties, prevents pick up and scoring. This is a big advantage to users of small Mack-Hemp straighteners because it results in a better surface on the products being processed. What's more it eliminates chrome plating the rolls, which is usually necessary when the straighteners are used for non-ferrous metals such as brass.

Graph-Mo steel gives Mackintosh-Hemphill two other important manufacturing advantages. It saves machining time because it's 30% easier to machine than ordinary tool steels. And it simplifies heat treating because of its uniform response to heat treatment.

Graph-Mo is one of four graphitic tool steels developed by the Timken Company. If you want more information about their use in dies, punches, gages and machine parts, write for the new Timken Graphitic Steel Data Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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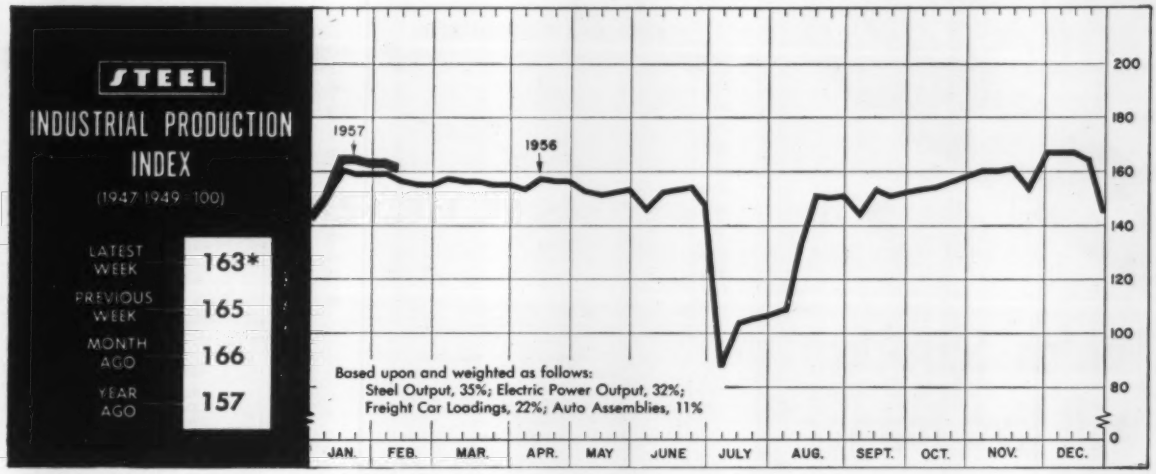


*Week ended Feb. 9.

Inflation: 1957 To Be Year of Decision

PRESIDENT Eisenhower's comments about the possibility of government wage and price controls have raised the question: Just how far has inflation gone? Here is the scoreboard for the 1947-1956 period:

Consumer Prices—Up 21.7 per cent.

Wholesale Prices—Up 18.6 per cent.

Average Weekly Gross Earnings—Up 60.4 per cent.

Average Hourly Gross Earnings—Up 60.1 per cent.

Purchasing Power of the Dollar—Down 17.6 per cent.

Disposable Personal Income—Up 68.6 per cent.

The figures speak for themselves. The fuss over inflation is at a fever pitch now because prices rose last year, especially during the second half. Here's the scoreboard for 1956:

Consumer Prices—Up 2.9 per cent.

Wholesale Prices—Up 4.4 per cent.

Average Weekly Gross Earnings—Up 5.4 per cent.

Average Hourly Gross Earnings—Up 6.2 per cent.

Purchasing Power of the Dollar—Down 2.6 per cent.

Disposable Personal Income—Up 3.6 per cent, based on three quarters of 1956. Indications are the year was up over 5 per cent.

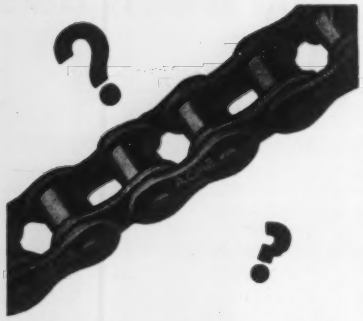
In most cases, the increase last year was well above the average for the 1947-1956 period. So far in 1957, there is every indication that those trends will continue unabated despite warnings of the consequences. That is why government officials, from top to bottom, are restudying price and wage control plans. Nobody wants them. Leaders of both parties doubt that Congress would grant the President the power to invoke them. But unless industry and labor can come up with a better solution, some kind of official control is possible if the gap between prices and the purchasing power of the dollar gets too wide.

Self-Perpetuating — Although

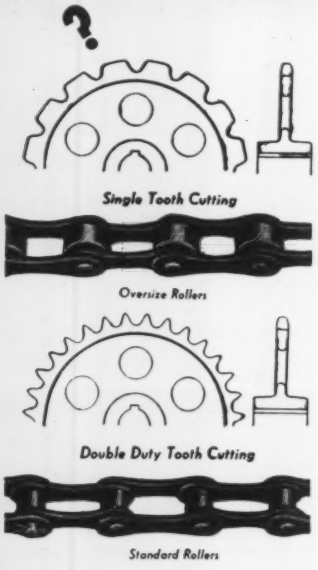
BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,469[1]	2,485	2,433
Electric Power Distributed (million kw-hr)	12,200[1]	12,322	11,343
Bituminous Coal Output (1000 tons)	8,770[1]	10,210	9,755
Petroleum Production (daily avg—1000 bbl)	7,450[1]	7,422	7,046
Construction Volume (*ENR*—millions)	$428.5	$406.8	$539.9
Auto, Truck Output, U. S., Canada (*Ward's*)	178,767[1]	173,063	165,110
TRADE			
Freight Car Loadings (1000 cars)	640[1]	648	684
Business Failures (Dun & Bradstreet)	320[1]	258	273
Currency in Circulation (millions)[3]	$30,595	$30,607	$30,219
Dept. Store Sales (changes from year ago)[3]	+4%	+2%	+5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$22,585	$22,853	$19,678
Federal Gross Debt (billions)	$276.0	$276.5	$279.7
Bond Volume, NYSE (millions)	$20.3	$20.0	$19.2
Stocks Sales, NYSE (thousands of shares)	10,438	9,048	10,311
Loans and Investments (billions)[4]	$85.3	$85.6	$84.7
U. S. Govt. Obligations Held (billions)[4]	$26.1	$26.3	$28.8
PRICES			
STEEL's Finished Steel Price Index[5]	225.92	225.92	209.10
STEEL's Nonferrous Metal Price Index[6]	246.9	246.8	267.9
All Commodities[7]	116.8	116.9	111.9
Commodities Other Than Farm & Foods[7]	125.1	125.2	120.2

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.



Which Sprocket will live longer



Here is double pitch chain applied on both a single and double duty tooth form sprocket. The single duty sprocket is necessary for use with double pitch chains using oversize rollers. The double duty sprocket used with double pitch chain having standard diameter rollers, has another "life" by simply moving the chain up one tooth after it is worn in its first position. Double duty cutting in many cases, doubles the life expectancy of a sprocket.

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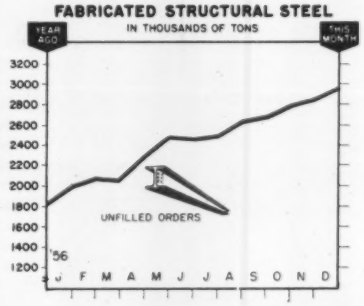
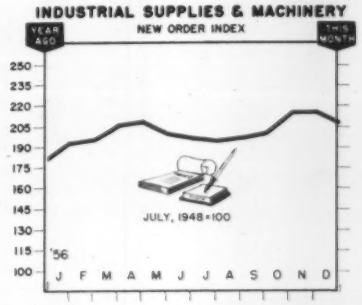


	Shipments 1956	Shipments 1955	Backlogs 1956	Backlogs 1955
Jan.	251.5	225.8	2,408	1,346
Feb.	285.4	213.4	2,476	1,360
Mar.	306.8	227.8	2,463	1,392
Apr.	289.6	242.3	2,687	1,444
May	306.2	223.0	2,896	1,592
June	284.7	282.3	2,859	1,706
July	165.5	219.4	2,904	1,639
Aug.	213.5	268.4	3,076	1,776
Sept.	240.9	289.1	3,108	1,854
Oct.	287.6	283.8	3,215	1,928
Nov.	276.0	258.9	3,252	2,075
Dec.	297.8	248.0	3,373	2,243
Total	3,205.5	2,982.2		

American Institute of Steel Construction.



	1956	1955	1954
Jan.	192.7	164.4	139.8
Feb.	195.9	175.1	140.5
Mar.	206.7	186.9	141.5
Apr.	208.6	173.7	131.9
May	200.6	191.6	129.4
June	197.8	189.1	136.4
July	195.6	163.7	119.4
Aug.	196.8	181.2	132.5
Sept.	200.7	203.2	148.1
Oct.	215.6	190.0	136.3
Nov.	215.9	189.7	146.2
Dec.	207.5	180.0	148.8

Amer. Supply & Machinery Mfrs.' Assn.

Charts copyright, 1957, STEEL.

the consumer has more money to spend than ever before, much of it is dissipated by the rising cost of living. The rise in hourly and weekly earnings mentioned above is somewhat of an illusion. It doesn't take into account the fact that as those earnings rise, so do the taxes.

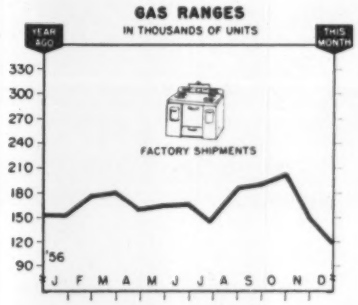
Many of today's labor contracts have built-in inflation clauses. As the cost of living advances, wages also advance. In addition, the long term contract guarantees minimum wage increases, which is a practical guarantee of minimum price increases to cover the costs. The huge federal budget, too, adds to inflationary pressures. Thus, even though price indexes have slowed down somewhat from the rapid rate of increase following the major wage negotiations in mid-1956, they are certain to shoot up again during the third quarter unless some practical solution is found to the problem.

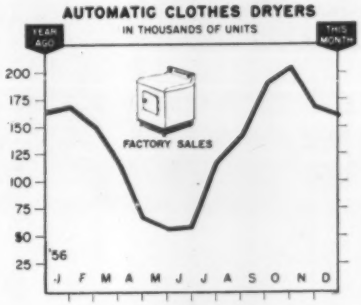
Index Dips Seasonally

Don't be surprised or worried if the various industrial production indexes show a decline for a while. It's one of those things that happens at this time of the year.

STEEL's production index for the week ended Feb. 9 dipped to 163 (1947-1949=100), 2 points under the level for the previous two weeks. The slight decline is caused by two things: A slight seasonal decline in the output of electrical energy and a significant weakness in freight car loadings. If there is a single clue to the direction of the business trend for 1957, this could be it. Railroad officials say it is too early to tell whether a disappointing January will set the longer term pace, but there is no doubt that the first quarter was grossly overestimated. The two categories showing the most significant declines are miscellaneous freight and coal. Most metalworking shipments included are in the miscellaneous freight category. Coal is well off the 1956 pace. As the result of floods in the southern coal fields, the situation will get worse before it gets better. The first quarter is ordinarily a poor one for railroads, so the definite trend probably won't be established until spring.

Steel production is easing off a bit, but not because of lack of bookings. The biggest problem is a strike at one of the leading suppliers of oxygen for the steel in-





	Shipments—Units 1956	1955	1954
Jan.	153,500	153,400	137,000
Feb.	178,400	186,500	152,900
Mar.	181,900	218,100	188,200
Apr.	161,400	183,200	172,400
May	166,800	187,700	163,800
June	169,500	204,000	174,300
July	146,800	146,300	134,500
Aug.	187,800	220,000	179,400
Sept.	191,000	219,100	203,900
Oct.	202,900	210,300	197,100
Nov.	149,700	184,400	174,000
Dec.	118,700*	153,600	147,300
Totals	2,008,400*	2,266,600	2,024,800

*Preliminary.
Gas Appliance Mfrs. Assn.

	Factory Sales—Units 1956	1955	1954
Jan.	166,243	115,383	82,195
Feb.	148,522	109,215	62,488
Mar.	113,031	113,498	51,796
Apr.	64,923	73,978	37,661
May	55,330	49,228	26,533
June	58,441	70,616	30,297
July	117,548	60,516	40,755
Aug.	144,537	136,190	80,165
Sept.	192,724	169,905	107,084
Oct.	206,929	166,889	122,182
Nov.	170,529	157,153	138,254
Dec.	162,953	161,823	115,341
Totals	1,601,710	1,384,394	897,751

American Home Laundry Mfrs. Assn.

dustry. In addition, some furnaces which have been pushed at capacity levels for many months are in need of repairs. These minor fluctuations have had no noticeable effect on the production index.

Auto production is running well ahead of the corresponding 1956 period. During the week ended Feb. 9, auto producers scheduled their heaviest weekly output since the middle of December. The big push is coming from Chrysler Corp., which is operating at near capacity levels in all divisions. With sales strong in both the low and high priced fields, the mediums are still the key to success or failure in reaching 6.5 million units in 1957.

OrdersDown,ProductionUp

New orders for durable goods declined during December to a seasonally adjusted $14.4 billion. While this was slightly below the two previous months, it was above the average for the year. Production of $14.4 billion in December was the highest for the year. Inventories advanced a bit to $30 billion, but the inventory-sales ratio dipped to 2.05, the lowest level since June, 1956. Unfilled orders remained at $59.1 billion.

Employment Stays Strong

Employment followed the seasonal pattern for January by declining to 62,890,000, down 1.7 million from mid-December. This is normal following the cutbacks in retail and postal part-time help during the Christmas season. Nonfarm employment set a January record at 57.9 million. Unemployment rose seasonally to about 2.9 million.

Trends Fore and Aft

• Despite reports of a slow year, retail sales of radio sets, exclusive of auto radios, established an all-time high last year at 8,332,077, and retail sales of 6,804,783 TV sets made 1956 the third best in the industry's history, says the Radio-Electronics-Television Manufacturers Association.

• Look for soft coal prices to increase 25 cents a ton April 1.

• The week ended Jan. 31 was one of the most disastrous for industrial and commercial failures—320 businesses folded, according to Dun & Bradstreet Inc.

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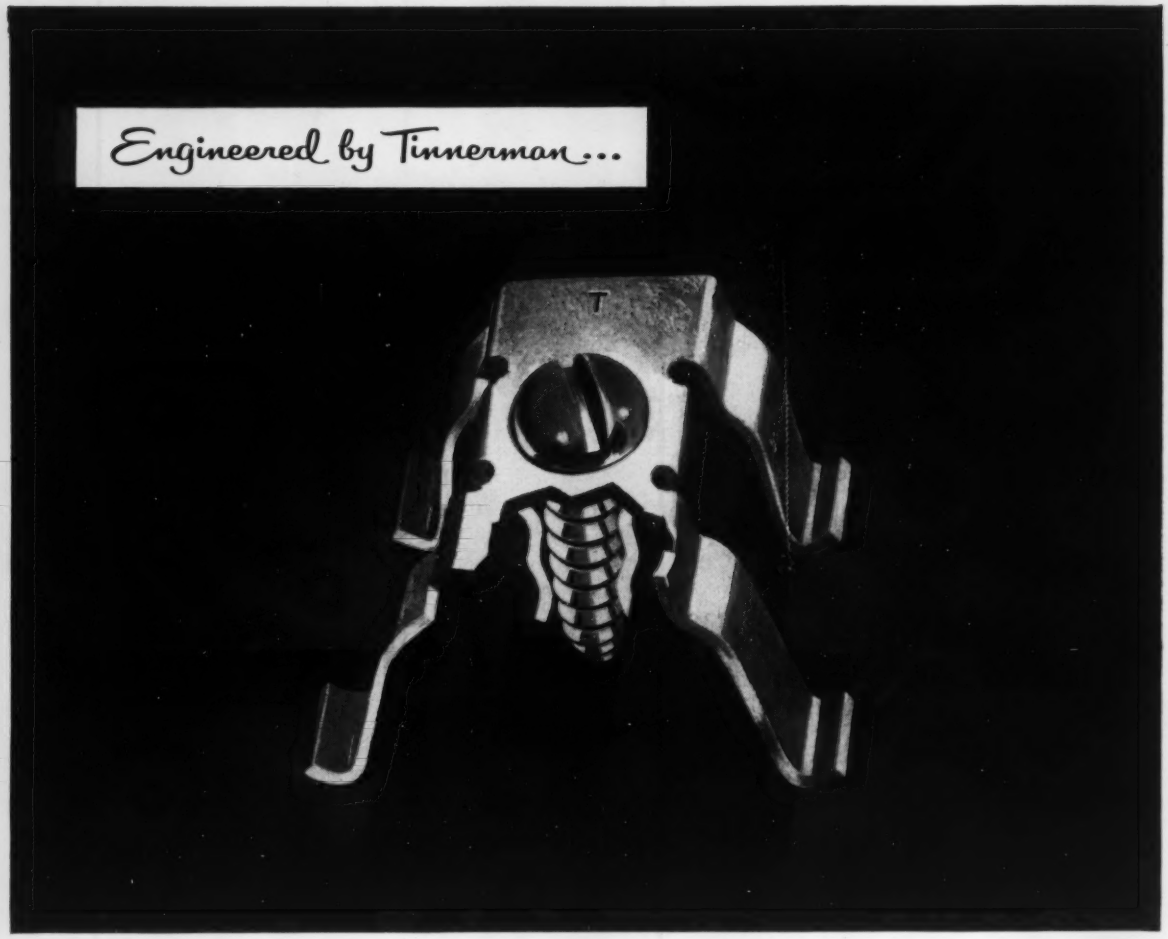

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Installation is fast and simple. Two overlapping glass panels are positioned against the extrusion. A screw driven into the spring-steel SPEED CLIP spreads the two center fingers outward to grip the inner walls of the extrusion. No secondary fastening devices required—SPEED CLIPS hold tight, yet are easily removed to permit replacement of glass.

This is another example of a fastener engineered by Tinnerman to satisfy special, complicated fastening problems. A Fastening Analysis of your products may produce a similar cost-cutting solution. See your Tinnerman representative soon.

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WESSON C. MILLER
Parker-Hartford sales mgr.

PHILLIP A. CARLETON
Laminated Shim p.a.

CLAIRE U. HAVERLY JR.
chief eng., Haverly Equipment

KURT J. UCKO
Kurt Orban vice president

Wesson C. Miller, assistant sales manager, **Parker-Hartford Corp.,** Hartford, Conn., was promoted to sales manager. **Richard G. Campbell** was elected controller.

Phillip A. Carleton was made purchasing agent for **Laminated Shim Co.,** Glenbrook, Conn.

James R. Fagan was elected president and treasurer, **Foote Bros. Gear & Machine Corp.,** Chicago. Former executive vice president-treasurer, he succeeds **William A. Barr,** now chairman.

Patterson Foundry & Machine Co., East Liverpool, O., subsidiary of Ferro Corp., appointed these product division managers: **C. G. Keirnan,** mixing and drying; **J. E. Wright,** size reduction and classification; **E. W. Stephenson,** ceramics and replacement components; **R. W. Campbell,** process systems.

Merle Nobel was made Cincinnati district manager for **Luria Bros. & Co. Inc.** He was formerly with the Cleveland office.

John W. Graham was named manager, product research and development, for **Porter-Cable Machine Co.,** Syracuse, N. Y. **Russell Stoll** was made supervisor of engineering.

Kearney & Trecker Corp., Milwaukee, elected **Morris L. Hutchens** vice president-engineering. He was chief engineer. **Herbert Whitney** was named chief metallurgist; **Charles Parske,** chief engineer, general engineering department.

Claire U. Haverly Jr. was named chief engineer; **Rudolph Foss,** regional sales manager of **Haverly Equipment Division,** John Wood Co., Syracuse, N. Y. Mr. Haverly was assistant to the division vice president-general manager.

James F. Traa was made Chicago district sales manager, **United States Steel Corp.,** to succeed **John H. Morava,** now president, United States Steel Supply Division.

Clem W. Gottschalk was elected a vice president of **Jones & Laughlin Steel Corp.,** Pittsburgh.

American Steel Band Co., Pittsburgh, elected **J. H. Bowman Jr.** vice president-sales; **H. B. Bowman,** vice president - operations; **N. R. Hettman,** general sales manager; **M. A. Gore,** sales manager-ventilators.

Harry C. Hatch was elected president, **Stanley Steel Co. of Canada Ltd.,** Hamilton, Ont. He succeeds **John C. Cairns,** now chairman. Mr. Hatch was vice president-general manager.

H. C. Goodrich was made assistant to the vice president-general sales manager of **Lamson & Sessions Co.,** Cleveland. Former central district sales manager, he is replaced by **Robert M. Casey.**

John R. Patton, metallurgist at **General Steel Castings Corp.,** Granite City, Ill., was appointed assistant manager-roll sales. He now is at the National Roll & Foundry Division, Avonmore, Pa.

Kurt J. Ucko, sales manager, machine tool division, **Kurt Orban Co. Inc.,** Jersey City, N. J., was elected a vice president. He joined the company in 1952 as a sales engineer for its gear division. Last April he became manager of the combined gear and machine tool division.

E. C. Phelps was made works manager of **Cooper - Bessemer Corp.'s** Mt. Vernon, O., plant. He succeeds **Peter R. Letz,** assigned to direct an expansion program at both the Mt. Vernon and the Grove City, Pa., plants. **Harold C. Johnson** was made manager of manufacturing for both plants. **C. W. Gilchrist,** former foundry superintendent, was made assistant works manager.

Harry L. Welsh and **William D. Potter** were named vice presidents of **Burkhardt Steel Co.,** Denver. Mr. Welsh, former chief engineer, will be in charge of engineering and construction. Mr. Potter will be in charge of sales.

Otto Krauss fills the new post of director of manufacturing research, **Whirlpool-Seeger Corp.,** St. Joseph, Mich., effective Mar. 1. He will be succeeded as general manager of the St. Joseph division by **Glenn A. Evans** who was replaced, Feb. 18, as general manager, Marion, O., division by **Jasper F. Burt. S. J. Smith** succeeds Mr. Burt as La Porte, Ind., division plant manager.

William F. May was made manager of manufacture, central di-

RAYMOND F. LaCOUR
Hauserman division chief

CHARLES W. STONE
heads Interstate Drop Forge

S. S. RICE
J. Bishop & Co. metallurgist

ROBERT E. JONES
Assembly Products post

JOHN R. BOSTON
Claude C. Slate sales mgr.

J. K. GERLACH
Cleveland Punch & Shear post

vision, **American Can Co.**, at Chicago.

Robert E. Jones was appointed manager of meters and contact meter-relays for **Assembly Products Inc.**, Chesterland, O. He was manager of the panel meter division.

Adolph A. Hirstius was made assistant sales manager, Philadelphia district, for **American Steel & Wire Division**, U.S. Steel Corp. He succeeds **Raymond W. Drake**, now assistant sales manager, Pittsburgh district.

J. H. Whelan was made manager of warehousing for **Crucible Steel Co. of America**, Pittsburgh. **Paul P. Hubert** was named assistant manager in charge of warehouse inventory.

Mellor W. Stevenson was made general sales manager, railway division, **National Malleable & Steel Castings Co.**, Cleveland. He is replaced as general manager-sales for the division at St. Louis by **Howard Stark**, effective Mar. 1.

John R. Boston was made sales manager, **Claude C. Slate Co.**, Glendale, Calif.

J. K. Gerlach was appointed sales manager, **Cleveland Punch & Shear Works Co.**, Cleveland. He formerly served in a sales capacity with Cyril Bath Co.

United States Steel Corp., Pittsburgh, elected **M. M. Chapman** assistant vice president-sales distribution; **John R. Johnston**, assistant vice president-sales solicitation.

Charles W. Wheeler was appointed manager-solvent sales for **Chlorinated Products Division**, Diamond Alkali Co., Cleveland. He was with Parker Rust Proof Co.

Thomas H. Pearce fills the new post of executive vice president, **National-Standard Co.**, Niles, Mich. He was vice president, engineering and manufacturing. **George Hussey Jr.**, secretary, was given the additional duty of executive assistant, another newly created post.

Raymond F. LaCour, formerly with Aetna Steel Products Corp., was appointed supervisor of the Divider-Wall Division of **E. F. Hauserman Co.**, Cleveland.

Charles W. Stone was elected president, **Interstate Drop Forge Co.**, Milwaukee. He succeeds his father, the late **Charles E. Stone.**

S. S. Rice was appointed chief metallurgist, precious metals and stainless steel products divisions, **J. Bishop & Co. Platinum Works**, Malvern, Pa. Mr. Rice was chief metallurgist and chief chemist of Ekco Products Co.

Clifford H. Hagberg was made assistant sales manager, **Bullard Co.**, Bridgeport, Conn. **Edward A. Sundstrom** was made Chicago district sales manager, replacing Mr. Hagberg.

Dr. Lee L. Davenport was appointed to an executive post with **Sylvania Electric Products Inc.** He will become president of Sylvania-Corning Nuclear Corp. upon its formation in the near future. Dr. Davenport, formerly executive vice president of Perkin-Elmer Corp., Norwalk, Conn., will have offices at Sylvania's atomic energy division headquarters in Bayside, Long Island.

Robert B. Hanna Jr. was made general manager of **General Electric Co.'s** industrial heating department in Shelbyville, Ind.

Donald H. Bissell was elected president of **Chromium Corp. of America**, New York. Former vice president and secretary, he is succeeded by **Charles H. Belvin.**

At U.S. Steel Corp.'s Lorain, O., Works, **National Tube Division**, **James O. Light** was made division superintendent, lower works operations. He is succeeded by **Luis Sanchez** as superintendent, open hearth and foundry department.

S. H. Stupakoff, a vice president of **Carborundum Co.**, Niagara Falls, N. Y., was named adviser to the group vice president and to the vice president-research and development. **W. H. Wendel**, former vice president-general manager, coated abrasives division, was made group vice president in charge of the Stupakoff Division, Coated Abrasives Division, Curtis

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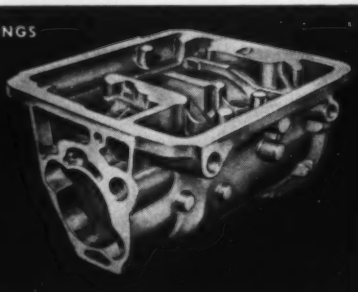
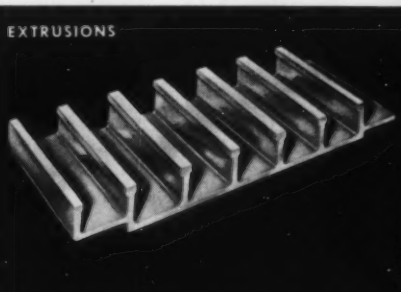


FORGINGS

EXTRUSIONS



RICHARD C. ROBINSON LESTER J. LARISON R. A. SHAW SR.

appointments at American Bridge Division

Machine Corp. and the Globar Division. **R. A. Barr** becomes general manager, Stupakoff Division at Latrobe, Pa.

R. A. Wendorf was made sales manager, automotive division, **A. O. Smith Co.**, Milwaukee.

Walter D. Hart was appointed assistant sales and engineering manager, aviation division, **Kelsey-Hayes Co.**, Detroit. **B. E. Derry** was made general manager, French & Hecht Division.

Youngstown Rubber Products Co., Youngstown, elected **Porter S. Watson** president-treasurer; **Willard F. Burr**, chairman; **Harold S. Frazier**, vice president.

Michael F. Tupica was made manager, Wirecom Division, **Cook Electric Co.**, Chicago.

Roy J. Dingius was named vice president and general manager, **Reco Steel Corp.**, San Diego, Calif.

Donald M. McGrath was named San Diego, Calif., plant manager, **Solar Aircraft Co.**

Charles P. Luckie was made Minneapolis district sales manager, **Federated Metals Division**, American Smelting & Refining Co.

Herbert A. Finke was promoted to general manager, **Polytechnic Research & Development Co. Inc.**, Brooklyn, N. Y. He was director of engineering and manager of operations.

LeRoy Peterson was appointed sales manager of a newly established branch office of **Wheelco Instruments Division**, Barber-Colman Co., at Springfield, Ill.

Richard C. Robinson was appointed manager of operations, **American Bridge Division**, U.S. Steel Corp., Pittsburgh. He is succeeded by **Lester J. Larison** as manager of the division's Gary, Ind., plant. Mr. Larison was plant manager at Roanoke, Va. **R. A. Shaw Sr.** was made executive assistant to the president of American Bridge. He is succeeded as treasurer by **O. E. Barnum**, former treasurer of U.S. Steel Supply Division.

N. Heath McDowell was named general sales manager of **Airaterra**, Glendale, Calif., newly formed corporation which will market and service products of Roylyn Inc. Mr. McDowell was vice president-general manager, Aviation Developments Inc.

G. Lincoln Ryther was made sales promotion manager, **Lewis-Shepard Products Inc.**, Watertown, Mass. He succeeds **Fred L. Hoffman**, promoted to the new post of administrative engineer.

Robert P. Gira, sales manager for the manufacturing division of **Topp Industries Inc.**, Los Angeles, was appointed general sales manager.

Aluminum Co. of America, Pittsburgh, named **Harold C. Erskine** assistant general production manager. He was general manager, castings division. That operation is now part of the enlarged fabricating division, of which **John L. Patterson** is general manager.

National Acme Co., Cleveland, elected **Raymond E. Channock** vice president and treasurer.

Vincent Brady, formerly in charge of electric melting at the Midvale, Pa., Works of **Pencoyd Steel & Forge Corp.**, was made superintendent of melting.

Robert B. Freeman was made works manager; **Robert F. Miller**, sales engineer at **Coolidge Corp.**, Middletown, O.

H. Dorsey Hammond was elected vice president - sales, **Arlington Bronze & Aluminum Corp.**, Baltimore. **Bert B. Bevans** was made vice president-production.

Adolph G. Abramson, manager, commercial research department, **SKF Industries Inc.**, Philadelphia, was appointed director of economic planning.

Ben L. Bishop succeeds **Austin T. Hunt** as manager of sheet and strip sales, **Bethlehem Steel Co.**, Bethlehem, Pa.

William J. Swallow was made manager of the Chicago assembly plant of **Ford Division**, Ford Motor Co., succeeding **S. L. Simmons**, promoted to plant manager of the Mahwah, N. J., assembly plant. Mr. Swallow was manager, Buffalo assembly plant.

Firth Sterling Inc., Pittsburgh, appointed **Herbert H. Hager** general superintendent, steel production. He was superintendent of production planning in the steel division.

Fairbanks Co., New York, appointed **Sheldon H. Ingram** branch manager at Pittsburgh.

OBITUARIES...

Joseph F. Ross, 63, president, **J. J. Tourek Mfg. Co.**, Chicago, died Feb. 2.

Robert I. Adams, 56, purchasing agent of **Thor Industries Ltd.**, Toronto, Ont., died Jan. 29.

Carl C. Brereton, 55, vice president, **Supreme Metal Treating Co.** and **Huber Metal Processing Co.**, Milwaukee, died Feb. 2.

Milton A. Cox, 56, former general traffic manager, **Doehler-Jarvis Division**, National Lead Co., Toledo, O., died Jan. 21.

Robert C. Good, executive vice president, **Union Electric Steel Corp.**, Pittsburgh, died Jan. 11.

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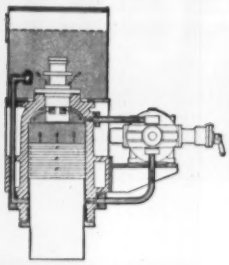
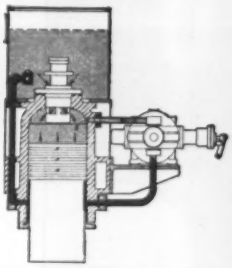


Fastraverse Ram Advance

is controlled by rate pump; withdraws oil from supporting area. FASTRAVERSE prefill system augments oil to main cylinder from overhead reservoir during advance stroke.



Fastraverse Ram Return

At reversal, pump delivers oil to supporting area by reversing direction of oil flow through pump. At this time, FASTRAVERSE prefill system opens and allows excess oil not handled by pump to be discharged back to tank.

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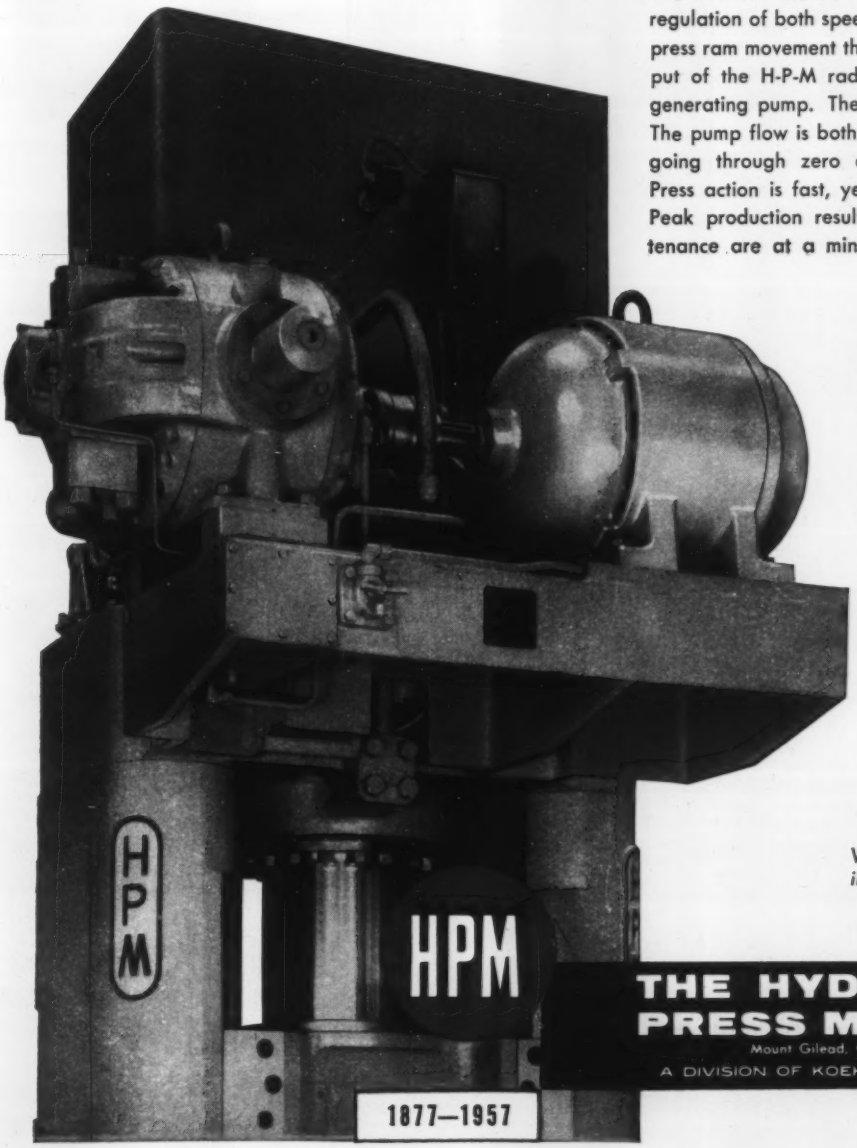
The H-P-M "Closed Circuit" system provides regulation of both speed and direction of every press ram movement through control of the output of the H-P-M radial piston type pressure generating pump. There is no reversing valve. The pump flow is both variable and reversible, going through zero at each press reversal. Press action is fast, yet smooth and shockless. Peak production results; idle time and maintenance are at a minimum.



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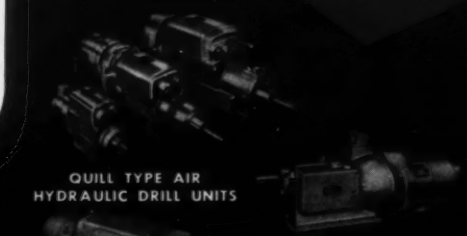

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Jessop Gets Mill

Federal court approves purchase of Green Riven Steel Corp. New owner plans expansion

PURCHASE of Green River Steel Corp., Owensboro, Ky., by Jessop Steel Co., Washington, Pa., has been approved by a U.S. district court in Kentucky.

The decision will enable the Green River firm to launch an expansion program if the consolidation is approved by its stockholders. Jessop Steel also will benefit: Its line of specialty steels will be broadened and it will move into third position among specialty steel producers.

Will Expand—Jessop will advance a minimum of $1.5 million to expand the plant facilities of its new subsidiary. Green River began operations in a $13-million plant in 1953. It produced 180,000 tons of steel (some 40 per cent of it in alloy grades for the aircraft industry) in 1956.

Green River has two 60-ton electric furnaces, a 2500-ton and a 1500-ton press, a 24-in., 2-high reversing blooming mill and a 2-stand bar mill. The firm has no finishing facilities. Jessop is a producer of specialty steels, including tool, die and saw steels; cast-to-shape steel; ground flat stock; armor plate; and stainless clad steels.

Opens Cleveland Sales Office

Westinghouse Electric Corp. has opened a factory branch in Cleveland to handle sales of the firm's air conditioning products. Perry E. Davis is manager.

Opens Detroit Office

Scovill Mfg. Co., Waterbury, Conn., will open a branch sales office in Detroit for mill products only. It supersedes an arrangement with William Robert Wilson & Associates, Detroit.

Leece-Neville Gets Loan

Leece-Neville Co., Cleveland, has been granted a $1-million term loan by the Phoenix Mutual Life Insurance Co., Hartford, Conn. The 12-year loan will be used for retooling the company's line of electrical equipment for the automotive and transportation industries.

Organizes Foundry Division

American Brake Shoe Co., New York, has organized a new Engineered Castings Division, headed by N. George Belury, vice president of the parent firm. The division will integrate five foundries.

Purchases Mercury Grinders

Mattison Machine Works, Rockford, Ill., has purchased the line of production grinders built by Mercury Engineering Corp., Milwaukee. President Alan C. Mattison announced that production rights, patents, engineering drawings, tooling and parts in stock were included in the sale.

Completes New Metal Shop

General Electric Co.'s Metallurgical Products Department, Detroit, has completed a new metal shop at Kenilworth, N. J. It'll make special shaped cemented carbide tools.

Makepeace To Build Plant

D. E. Makepeace Co., Attleboro, Mass., will build a 50,000 sq-ft building at Plainville, Mass. The plant will be used for operations that are heavier than those which can be handled suitably by present Attleboro facilities. The company makes tubing and wire.

Opens New Maryland Office

Edgewater Steel Co., Pittsburgh, has opened a new office at Silver Spring, Md., near Washington.

Conforming Matrix Expands

Conforming Matrix Corp., Toledo, O., leased 5000 sq ft of space which will be added to its Machine Building Division. The capacity of the nickel tank in the masking department is being doubled, and a research and development department has been set up. The firm makes spray decorating masks,

(*Please turn to page* 140)

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36,000 lb.

Shown here is the Model 38M Dempster - Dumpster handling two types of containers. Above a standard 15 cu. yd. bottom dumping container. At left and below a 10 cu. yd. Tilt dumping container in pick-up, haul and dumping positions.

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TO ELIMINATE WASTE in time, labor and the expense of double-handling heavy salvable materials, this Dempster-Dumpster, installed in one of the nation's leading industrial plants, lifts, hauls and discharges 18-ton payloads with only one man, the driver.

Such heavy load requirements, of course, are the exception. But the important factor in the tremendous savings of the Dempster-Dumpster System is not capacity. It is the ability of only one truck-mounted Dempster-Dumpster, constantly on the move, serving many containers of various types and sizes, standard or special, built to meet the requirements of any plant.

Our records of hundreds of installations in plants of almost every known classification, show savings of from 60 to 90 per cent over previous methods. Moving materials from one point to another swiftly, economically, is a problem in every industrial plant in the nation. Most of these plants need the Dempster-Dumpster System.

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Can the Dempster-Dumpster System be used profitably in your plant? Let one of our engineers discuss it with you. *Dempster Brothers, Inc. . . . serving all industry throughout the nation.*

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(*Conclude from page* 137)

mask washers and spray painting machines.

Rheem Sells Division

Steel Processing & Distribution Co., Los Angeles, purchased the Beam Highway Guard Rail Division of Rheem Automotive Co., a division of Rheem Mfg. Co., New York.

Organizes Diecasting Firm

California Die Casting Co. has been established at 6200 S. Central Ave., Los Angeles. Principals are W. L. Purcell and Q. M. Williams.

ASSOCIATIONS

Association of Steel Distributors Inc., New York, re-elected these officers: President, Herman Williams, Williams Steel & Supply Co., Milwaukee; vice president, Gilbert Merrill, Meldon Steel Co., Brooklyn, N. Y.; vice president, Seymour Waldman, Rolled Steel Products, Skokie, Ill.; secretary, Jack Zweben, Cayuga Steel Co. Inc., New York; treasurer, Arnold Hanson, Amay Steel Co., New York.

Construction Industry Manufacturers Association, Chicago, elected these officers: President, C. E. Killebrew, Clark Equipment Co., Benton Harbor, Mich.; first vice president, Boyd Oberlink, Allis-Chalmers Mfg. Co., Milwaukee; second vice president, Henry Barnhart, Baldwin - Lima - Hamilton Corp., Philadelphia.

National Constructors Association, New York, elected these officers: President, C. D. Haxby, Rust Engineering Co., Pittsburgh; vice president, C. B. Whyte, Procon Inc., Des Plaines, Ill.

American Institute of Consulting Engineers, New York, elected E. H. Anson, Gibbs & Hill Inc., New York, president.

Metal Lath Manufacturers Association, Cleveland, elected these officers: President, L. C. Hollerbach, Wheeling Corrugating Co., Wheeling, W. Va.; vice president,

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TOOL HOLDERS AND THROW-AWAY INSERTS

You can keep your production lines rolling and your operating costs low when you combine good equipment with an efficient tooling program. *Carmet tool holders and throw-away inserts fill the bill on both counts!*

Carmet tool holders permit quick, accurate indexing of blanks to a new cutting edge . . . or complete exchange of one blank for another . . . without dismantling tool setup. Grinding is eliminated, and machine downtime is reduced to practically nothing.

Carmet tool holders are cadmium plated to resist corrosion and chip erosion. They can accommodate either 1/8" or 3/16" thick blanks. Improved clamp screw eliminates need for special wrench . . . is accessible from both top and bottom of tool holder. Carmet inserts are permanently marked for positive grade identification assuring you the right blank for the right job.

There are over 90 styles and sizes of Carmet tool holders to choose from and 20 sizes of Carmet throw-away inserts available in six different grades . . . either utility or precision ground. Convenient Replacement Part Kits also available to service every style of Carmet tool holder.

Check your nearest A-L representative or distributor, or write *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.*

Write for your copy:

Carmet Tool Holders and Throw-Away Inserts

12 page catalog containing specifications of Carmet tool holders and inserts. Also data on replacement part kits for tool holders and other necessary information.

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*This is a *minimum* figure. It is based on a dependable survey of requirements of ONLY the major steel users who are located nearer to recommended steel plant sites in the Land of Plenty than to existing steel producing centers. Secondary volume users would increase the demand substantially.

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M. K. Brown. Penn Metal Co. Inc., Boston.

James V. Roughan, Price Electric Co. Division of Consolidated Electronics Industries Corp., Frederick, Md., was elected president of **National Association of Relay Manufacturers**, that city. Other officers are: Vice president, J. L. Pfeffer, Struthers-Dunn Inc., Pitman, N. J.; secretary-treasurer, K. H. Bohaker, Sigma Instruments Inc., Boston.

Calvert L. Willey has been appointed administrative secretary of **American Society of Lubrication Engineers**, Chicago.

CONSOLIDATIONS

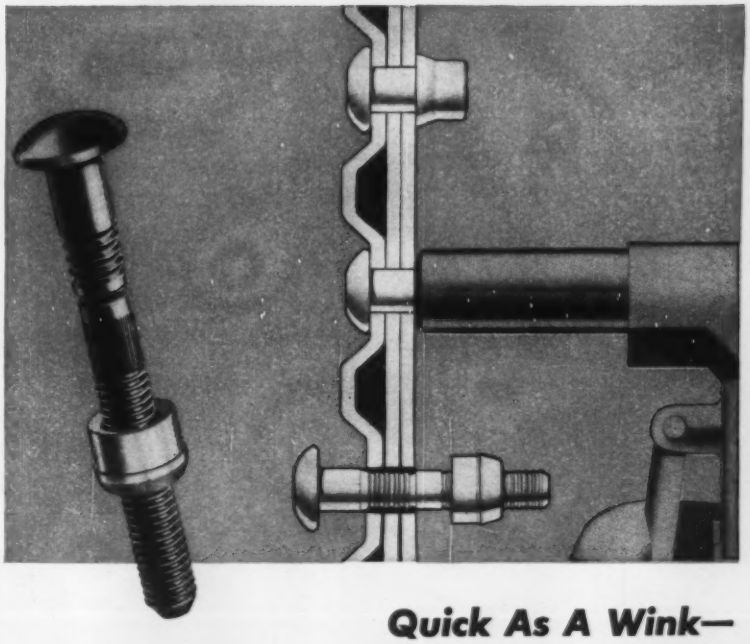
Yale & Towne Mfg. Co., New York, is acquiring **Contractors Machinery Co. Inc.**, Batavia, N. Y., manufacturer of self-propelled, front-end bucket loaders; patrol graders; tamping rollers; and snow plows. Yale & Towne will operate the property as its Contractors Machinery Division with R. G. Allan as general manager.

August Thyssen-Huette A.G., Duisburg - Hamborn, Germany, steel producer, consolidated with **Niederrheinische Huette A.G.**, producer of crude and Siemens-Martin steel, bar steel, roll steel and rolled wire.

Bell Aircraft Corp. purchased **Lake Erie Engineering Corp.**, both of Buffalo, and will operate the hydraulic press manufacturing concern as a subsidiary.

Beckman Industries Inc., Fullerton, Calif., will merge with **Statham Laboratories Inc.**, Los Angeles, subject to approval by stockholders. Statham makes precision pressure transducers, accelermoters and other devices used in aircraft and guided missiles.

Clevite Corp.'s Canadian subsidiaries, **Clevite Ltd.** and **Paxol Ltd.**, St. Thomas, Ont., have combined operations into a single company, Clevite Ltd. The firm makes bearings and bushings and is an important supplier of rubber-and-



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In less than a second, with one squeeze of the trigger, a Townsend lockbolt pulls the work together with a high clinching action, is locked in place with uniform pressure. It is a quick method of producing tight, rigid, permanent fastenings that cannot loosen even under extreme vibration or shock conditions.

Townsend lockbolts combine the advantages of riveting and bolting—eliminate the disadvantages. Installation is fast—under certain conditions, one man will install 30 in only 60 seconds. Fewer workers will complete an assembly in less time than when riveting or bolting.

The clamping action, or clinch, of Townsend lockbolts is higher than rivets—is more uniform than bolts and nuts. The lockbolt fills the hole better than other fasteners, thus making possible a more rigid joint and also providing an effective liquid seal.

The Townsend lockbolt consists of two precision-made parts—a pin and a collar. Locking grooves are provided on the pin into which the collar is swaged by the pneumatic gun. The pulling section of the pin breaks in tension at a predetermined point when the setting action is completed.

Townsend lockbolts are available in steel and aluminum alloy, in 3/16", 1/4", 5/16" and 3/8" diameters, in grip lengths ranging up to 2", in various head styles. For information on Townsend lockbolts, write to Townsend Company, P.O. Box 237-C, New Brighton, Pennsylvania.

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NEW in toughness

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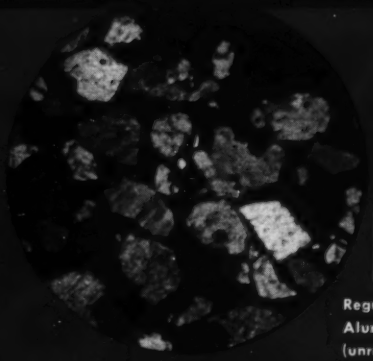
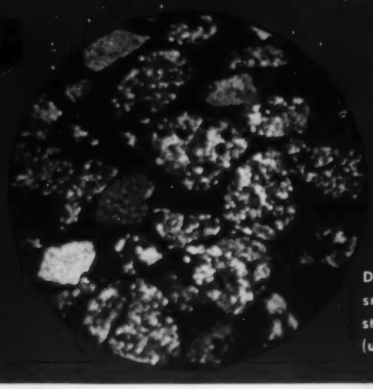


Regular Aluminum Oxide (unretouched)



D A Borolon smaller crystal structure (unretouched)

SIMONDS

DA Borolon® TRADE MARK

for resinoid bonded snagging wheels

A big forward step to new efficiency in grinding steel mill billets and foundry castings. Note the smaller crystalline structure of DA Borolon within each abrasive cutting particle! This means inherent toughness to resist fracture during grinding stress . . . more and sharper cutting edges on the wheel face . . . longer, useful wheel life . . . and more production per wheel dollar. Test after test on swing frames, floor stands and portables prove that Simonds wheels with this new aluminum oxide abrasive belong on your grinders for more production at lower cost. Write for descriptive bulletin.

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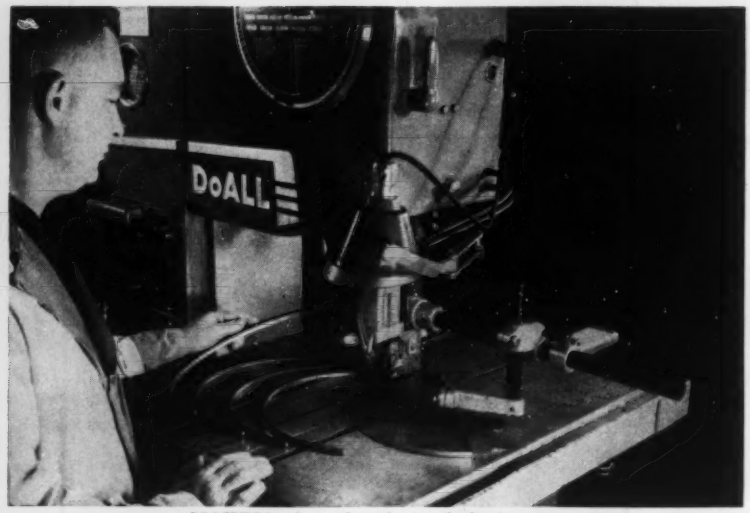

MAKING pieces for electronic brains . . .

Doing Brainwork with "Tools"...

Modern man differs little from his ancestors. Yet he has vastly greater control over his environment due to the tools he uses to extend the power of his muscles and senses and, now, of his brain in this day of electronic computers.

Today, giant mechanical brains help make airline reservations, process and print paychecks, record oil refinery production. They maintain continuous inventory control in department stores and handle many other complex jobs. These "tools" enable people to do more work in fewer hours. That's why there are more goods and services available for our rapidly growing population.

It takes mechanical tools to build these brains. The picture shows a DoALL Band Machine shaping out a part for a computer. The DoALL multiplies man's muscular energy a thousandfold. Its hydraulic power table feeds the work into the continuous cutting saw band. The band "slices" out a complete section of metal intact instead of reducing it to a pile of chips. So, the DoALL machine is faster and more economical to use than other types of machine tools on many, many jobs.

Like the mechanical brain, the DoALL is one of industry's newest tools. Continuous investment in such productivity-increasing tools has given the U. S. the equivalent of 600 slaves for every family. Thus, the tool owner and the tool user are the real and only source of today's high living standards.

"Giant brains" are made better, faster and cheaper with industry's newest basic tools at Remington Rand Univac Division, Sperry Rand Corporation.

In the realm of sawing, surface-finishing, and precision measurement, trained specialists of The DoALL Company are available to help manufacturers further improve the productivity of their employees.

Reprints of this series on economics available for your employees.

ASK FOR LITERATURE describing the newest DoALL band machines with hydraulic power feed, Demon high speed steel saw bands and many other improvements. Call DoALL locally, or write.

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metal parts. Paxol was a manufacturer of precision powdered metal parts.

A. P. Green Fire Brick Co., Mexico, Mo., purchased **Richard C. Remmey Son Co.**, Philadelphia. The Remmey firm devotes most of its production to the manufacture of special refractories, high temperature bonding mortar and high alumina refractories. Fire clay bricks also are manufactured at the plant.

NEW ADDRESSES

Catalytic Combustion Corp. moved to 4725 14th St. at Grand River, Detroit 8, Mich.

Superior Concrete Accessories Inc. moved to 9301 King St., Franklin Park, Ill.

Thor Power Tool Co. transferred its executive offices from Aurora, Ill., to the Prudential Building, Chicago.

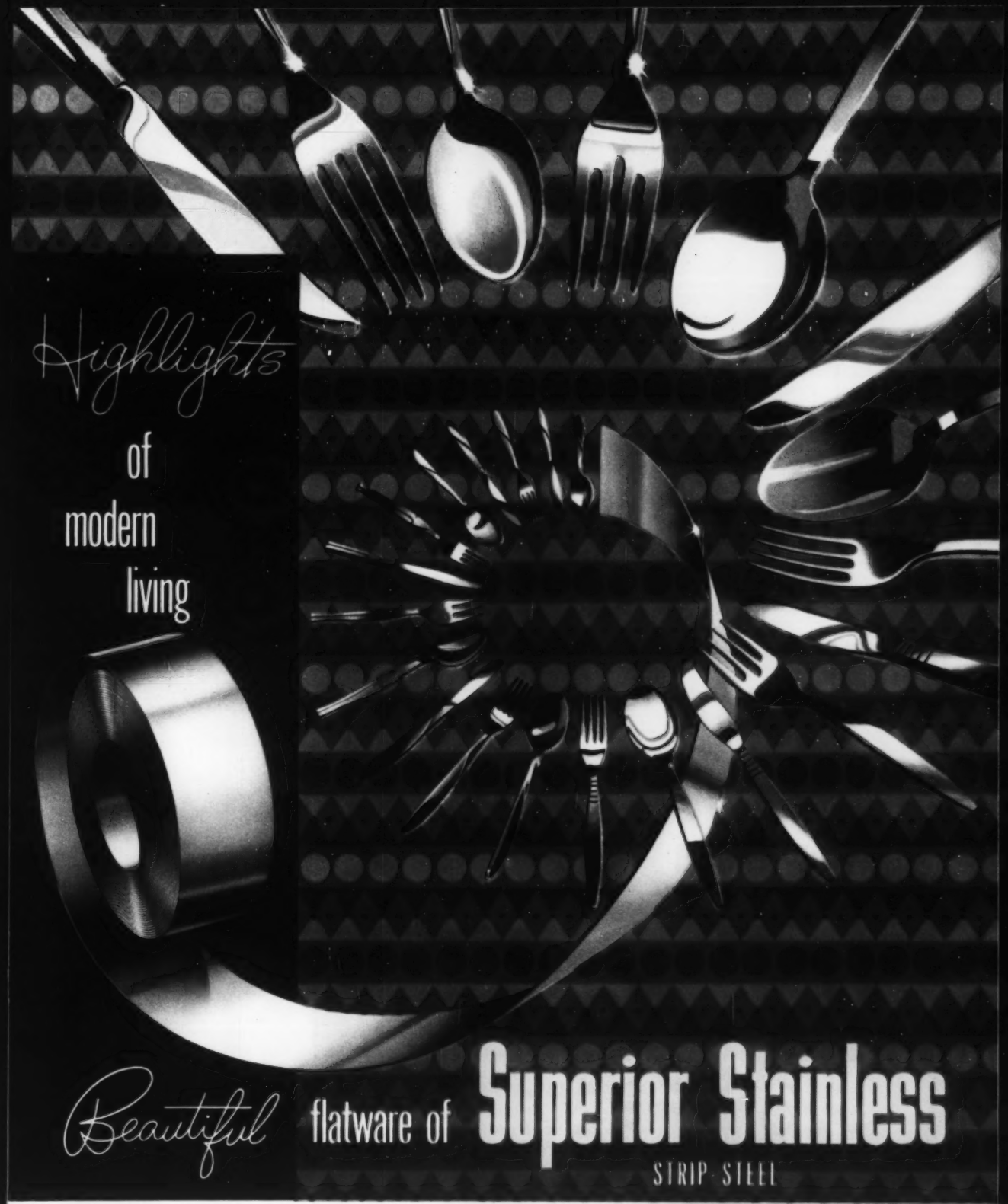
Niagara Machine & Tool Works, Buffalo, will move its Cleveland district office to 6333 York Road, Cleveland, on Mar. 15.

Robert F. Bourne, director of sales-national accounts for the **Colorado Fuel & Iron Corp.**, moved his headquarters from Claymont, Del., to the corporation's office at 575 Madison Ave., New York.

L. R. Ward Steel Products Co. moved to larger offices at 3605 Polk, Houston. The company is a distributor and fabricator of steel products.

Alvey Conveyor Mfg. Co., St. Louis, moved its Cleveland district office to 16360 Broadway, Bedford, O. R. E. Anderson is district manager.

Mansfield Products Co., Mansfield, Pa., is moving its operations to 924 Stowell St., Elmira, N. Y. The company plans to introduce a new line of porcelain enamel table bases in addition to its regular line of table bases and counter stools. R. L. Smith has been elected president of the company.



Beautiful flatware of **Superior Stainless**

STRIP STEEL

From the kitchen, to the finest tables in the land! That's the progress of modern stainless flatware—thanks to new-day design and finish. • Superior Stainless Strip Steel is chosen widely for flatware applications because of its *superior uniformity and fabricating ease.* From our bright coils come stainless pieces practical for the hardest service, handsome enough for Sunday best!

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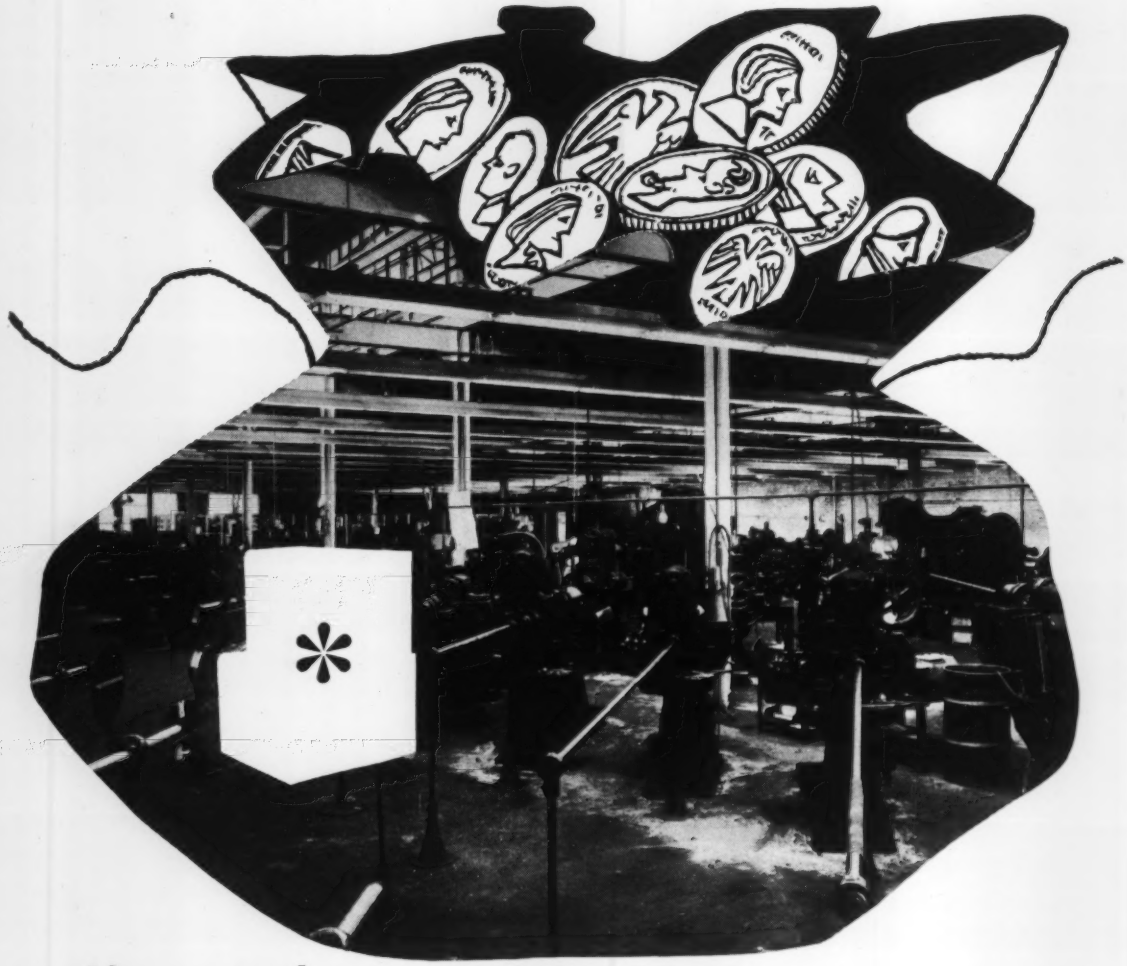
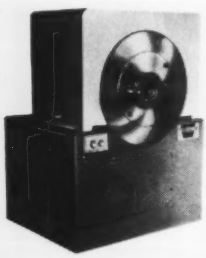
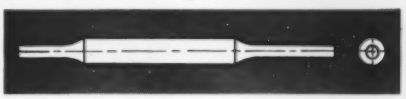


How much are you paying for the machine that isn't there?



Because a Torrington Rotary Swaging Machine shapes work by reduction instead of cutting metal away, many parts you are now machining can be *swaged* in less time, using less material.



Take this steel shaft, originally produced by turning. By using a smaller blank and *swaging* both ends (in 9 seconds), a 37% material saving was realized. Accuracy to ±.001" was secured with unskilled labor!

You can put many operations on a Torrington Swager—pointing, tapering, reducing, sizing, forming inside contours and threads. In a short time, your swaging machine will have paid for itself. If you operate screw machines you cannot afford to be without a Torrington Rotary Swaging Machine.

See for yourself what swaging is and what it can do. Let us show you our new, 20-minute, full-color film on swaging. And write for our catalog on Torrington Rotary Swaging Machines now.

THE TORRINGTON COMPANY • Swager Department
150 North Street, Torrington, Conn.

TORRINGTON ROTARY SWAGING MACHINES

Technical Outlook

17-4 PH DIALS— By making its machine tool dials from 17-4 PH (precipitation hardening) stainless steel in place of chrome plated SAE 4140, Kearney & Trecker Corp., Milwaukee, says it gains these advantages: 1. Higher hardness. 2. Easier fabrication. 3. Better appearance. 4. Lower cost. Dials are machined, graduated, then heat treated.

HARD SPRAY—A hand gun for depositing coatings of hard, refractory alumina and zirconia employs a powder feed. Oxyacetylene flame produces heat and pressure to deposit the powder in a fused or unfused state at the election of the operator. Coatings 0.010 in. thick can be deposited at a rate of 15 sq ft an hour, according to the maker, Metallizing Engineering Co. Inc., Westbury, N. Y.

THIN SKIN—Pins for timing chains must be hard (but not brittle) and soft enough at the ends to be upset. An induction method developed by the New Rochelle Tool Corp., New Rochelle, N. Y., puts a hard (Rockwell C60) case on 0.187 in. wire. First immersed in water, the hot portion develops a blanket of steam which collapses quickly when the induction current is turned off. Result: A case only 0.011-in. thick.

FINISH FOR MAGNESIUM—Two new chemical processes are said to give magnesium better corrosion and abrasion resistance and paint bonding properties. The single-package processes eliminate the need for precise measuring and mixing of several chemicals and do not require complicated control procedures. Turcoat 4245-2F is a production-line process for all forms of magnesium alloys. Turcoat 4091 is a liquid process for touching up coated magnesium that has been scratched or abraded. They were developed by Turco Products Inc., Los Angeles.

PHOTO RECORD— All orders shipped from Kaiser Aluminum & Chemical Corp.'s Newark, O. works by rail are photographed with a Polaroid camera after they are loaded—one shot is taken from each end of the car. One set goes to the district sales office in the customer's area, another goes with the packing list inside the car and another stays on file at Newark. The customer can see the condition of his shipment when it left. Kaiser Aluminum's shipping department can use the record to modify blocking and loading techniques.

BETTER FORGEABILITY—Rare earths (such as cerium and lanthanum) improve alloys that are difficult or impossible to forge when made by conventional methods. For example, they make it possible to forge corrosion resistant stainless No. 20 and improve hard-to-work high temperature alloys such as 16-25-6. Carpenter Steel Co., Reading, Pa., demonstrated this at the Drop Forging Association meeting last week in Chicago.

PLASTIC WHEELS— Their water absorption is equivalent to that of rubber; they have great resistance to oils, greases and chemicals; and they have high impact strength and abrasion resistance, says the Fairbanks Co., New York. The nylon-reinforced, industrial wheels won't mar floors and are sparkproof.

NEW GAS GENERATOR— A nitrogen generator with a controlled hydrogen content range of 0.25 to 25 per cent has been developed by Baker & Co. Inc., East Newark, N. J. It draws nitrogen from both the air and ammonia—conventional dissociators get it from ammonia alone. Nitrogen-hydrogen atmospheres are used in heat treating, annealing, brazing and sintering.

Metalworking Outlook—p. 101 *Market Outlook—p. 227*

AT BROMLEY, KY., two communities joined forces to build a co-operative waste disposal plant. Both profit from the larger, more efficient operation. It's an idea that neighboring industries might put to use.

In another community an industry worked out plans with the municipal sewage plant to handle industry waste on a scheduled basis. It prevents foul ups in the sewage system and saves money for both.

With appropriate fanfare, Buick Motor Division of GM has just opened an antipollution plant which purifies industrial waste water to the extent that fish can live in it.

***Concern*—These are all evidence that interest in efficient waste treatment and disposal is running high. You can tick off the reasons:**

1. State and local authorities are getting increasingly particular about what goes into sewers and streams.

2. Industries are discovering the positive advantages of a good neighbor policy, with all that it implies in the way of waste control.

3. Industry can ill afford the bad effects of personal injury and property damage resulting from industrial waste.

4. More industries are realizing that waste disposal is a true cost of production that must be charged against the product.

***Ideas*—Of all reasons, the last hits where it hurts the most. The three articles that follow this hit directly at the problem: "Consider the Alternatives," "Plan for Maximum Benefits," "Look for Dollar Returns."**

Each looks at the bright side of the picture, but there's another side to be remembered. Sometimes it's the result of circumstances beyond industry's control, but often it's a case of insufficient planning. The experience of a midwestern plating plant will serve for illustration.

Because of space limitations, waste treatment equipment had to be located at a point remote from plant process lines and the main sewer. The bill came to $285,000. Nearly half of this went for building, piping and sewer costs that might have been avoided.

Ideas for Waste Treatment

Idea No. 1

Consider the Alternatives

Prof. George E. Barnes of Case Institute of Technology, Cleveland, outlined the field at the Fifth Southern Municipal & Industrial Waste Conference at Chapel Hill, N. C.

INDUSTRY's approach to waste disposal has been changing. From being content with methods that made wastes innocuous, it began to re-examine production methods and to make substitutions that would eliminate wastes. More recently, it is moving toward recovery processes to recapture materials and cut down on purchases.

This is recognition that waste treatment is an integral part of production; the two must be planned together.

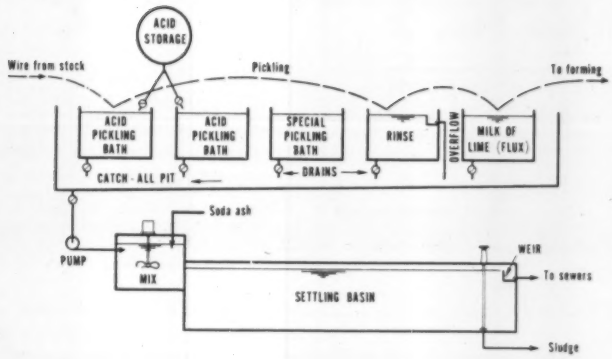
The Problem — Metalworking industries face the problem of controlling wastes to save the streams and sewers from substances that emanate from blast furnaces and rolling mills, from pickling or cleaning and from a variety of forming, finishing and plating operations that yield oils, detergents, alkalies, acids, cyanides and heavy metals.

In finishing industries, the waste problem generally starts in the cleaning house. In treating the rinses and spent baths which make up the wastes, consideration must be given to minimizing dragout and to separating weak rinses not needing treatment—in short, to cutting down on the volume of the wastes and saving materials.

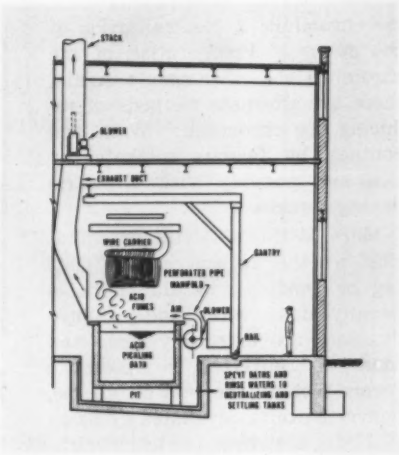
Answers—The resulting problem may be that of neutralizing the acid wastes and precipitating out the metals. This is generally cheapest with lime. Soda ash and caustic soda, though more costly, may have virtues offsetting price, such as reducing sludge volume.

Lagooning is usually the answer to sludge disposal, although sludges not commonly encountered have been dewatered successfully on vacuum filters.

Pickling—A recent example of a well-designed cleaning house for



Efficient waste disposal in a wire cleaning house



wire cleaning is shown above. Pickling is done with 10 per cent sulphuric acid, plus defoaming and inhibiting agents. Some wire is also pickled in permanganate or caustic for removing soap, and all wire is fluxed with lime.

When the acid content gets down to 2 per cent, the bath is dumped. These dumps, together with all rinses, are received in the catch-all pit. They are pumped to a mixing tank, treated with soda ash and settled. The clarified effluent in its neutralized state goes to the sewer, and the accumulated sludge is removed and carted away to waste.

Clean Air — In this cleaning house there is neither slop nor dirt, and the fumes are positively removed by passing a sheet of air over the hot tanks to blow the fumes into an exhaust system, delivering them to atmosphere through a high stack. The fume system eliminates corrosion in the structures and disagreeable working conditions sometimes found in cleaning houses.

The wire is mechanically handled in such fashion that no hand steering of the carrier is needed, and men work in cleanliness and comfort in ordinary shop uniforms. The installation handles up to 10 tons per hour, and the spent acid amounts to some 7000 gallons weekly.

Descaling — The steel industry has long known of the wastefulness of pickling as a descaling operation, and is adopting mechanical descaling wherever possible as an alternate. In this it seeks to recover iron otherwise going down the drain and to reduce the disposal problem.

Rolling mills are designing scale pits more rationally. Industry finds it suitable to use blast cleaning on castings. Many strip mills use mechanical descaling equipment, and a wire mill is recovering about 2 per cent of its production by the use of wire bending machines which serve as scalebreakers.

Pickle Liquor—In some localities waste pickling liquor may be sold for conversion by chlorination to chlorinated copperas, to be used as a coagulent instead of aluminum sulphate in water treatment. Waste liquor of this kind, containing 4 or more pounds of ferrous sulphate in the spent acid, is purchased by the city of Akron, O., from a nearby industry at practically the cost of hauling, and its use results in reduced chemical costs as contrasted with aluminum sulphate.

The steel industry is presently financing a major pilot plant project at Warren, O., in which the Ruthner process is being worked out to plant scale. The process is expected to eliminate pickling waste disposal problems in large installations by fully recovering both acid and iron.

Categories — The variety of wastes in metal finishing is about as great as the number of installations. However, wastes can be classified into relatively few categories: 1. Acids, 2. Alkalies, 3. Heavy metals, 4. Cyanides, 5. Miscellaneous, including dyes, and soluble and floating oils.

These wastes are to be found in both dilute rinse waters and spent concentrated baths. The way in which wastes in these categories are to be treated, and how the effluents and sludges resulting from such treatment are to be handled, will be a different problem for each installation. Several alternatives should be considered in every case.

Chromium—Recovering expensive chromium by ion exchange may be worthwhile. Spent chromium anodizing baths containing trivalent chromium and aluminum could be put through cation exchangers to be regenerated with sulphuric acid.

The cost of cleaning anodizing baths by any such treatment includes ion exchange equipment and acid for regeneration. The method yields wastes containing the sulphates of chromium and aluminum, which in turn might require disposal after precipitation with lime.

Chromic acid in drips and first rinses could be recovered by passing it through anion exchangers, to be regenerated with caustic. The resulting dichromate could in turn be put through cation exchangers to get back the original chromic acid. These exchangers would have to be regenerated with sulphuric acid.

Costs—Offsetting the economies of recovery would be the cost of the equipment, plus the cost of caustic and acid for regeneration of the anion and cation units. There would remain the disposal of the by-products of regeneration, or the excess acid and sulphates emanating from the cation unit.

The alternative to some such recovery processes is: 1. Reduction of

the chromium. 2. Neutralization of the acid. 3. Precipitation of the chromium and other metals. Again, there are alternate methods of reducing the chromium: With iron contact, by ferrous sulphate, by SO_2 and possibly with other reducing agents.

More Methods—Metal precipitation, whether in wastes from plating or anodizing or aluminum, is usually done with lime. Simple cyanides are extremely toxic and must be converted to innocuous forms such as the iron complexes, converted to thiocyanates by using $NaHSO_3$, destroyed (as by chlorination) or otherwise oxidized. Acidification of the cyanides to form HCN for dispersal to atmosphere has been successful at isolated sites.

Oils and soaps must be separated by flotation, precipitated with coagulents, or de-emulsified for decantation. These problems may overlap, for one cannot necessarily deal with these substances one at a time.

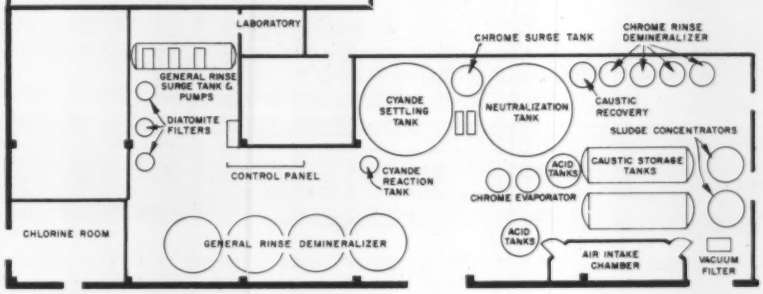
Alternatives — The continuous flow system requires less tankage, but even with surge tanks to equalize flow, one has to be sure that variations in quality of the raw wastes can be paced with chemical dosages to correspond. Batch treatment gives absolute control: Each batch is separately analyzed, dosed and delivered to fixed specifications at any rate desired.

A third manner of treatment has been used with some success on small installations. This involves the direct dosage of the drip and rinses spent before their release, without intermediate collection and treatment tanks. This again depends on accurate control, and equal provision must be made for concentrated dumps.

Which Treatment? — The fundamentals of treatment are well understood. Each type has advantages and disadvantages, and sometimes what is suitable in large installations is not suitable in small ones.

The basic attack on treatment problems will always be housekeeping—the saving or recovery of materials by careful management. That includes the keeping of records which show that wastes are released only after satisfactory around-the-clock treatment.

Idea No. 2



Plan for Maximum Benefits

The Eleventh Industrial Waste Conference at Purdue University heard what IBM did to get full benefit from treatment facilities which were designed into a new plant

WHEN International Business Machines Corp. decided to build a new plating and heat treating plant at Endicott, N. Y., one result was a complex waste treatment problem. It came about because the company uses a great variety of metal finishing treatments.

The plant is in the center of a highly developed residential area. In the spirit of good neighborliness, management insisted that only the most modern, effective waste control system go into it.

Requirements—The new plant is designed to:

1. Discharge into the Susquehanna river substantially waste-free water that more than meets state requirements and contains less than:

Free cyanide	0.1 ppm
Trivalent chromium	3.0 ppm
Hexavalent chromium	1.0 ppm

2. Recover as much chromium as possible from the chrome plating rinse system for re-use in the chrome baths.

3. Provide demineralized water for use throughout the plating department to improve bath and rinse quality, with fewer rejects.

Separation—In the new plant, all operating equipment is on the second floor. Service equipment, including waste treatment, is on the first floor. This separation simplifies operation and control, and gives maximum flexibilty.

The plating department produces the bulk of the wastes. Rinses from the plating machines and the still rinse area are collected in covered trenches lined with polyvinyl chloride which are under the plating room floor. These trenches serve to conduct noxious fumes from the plating tanks to a fume washer system so that gases exhausted to atmosphere are safe.

Liquid flow from the trench system is directed into surge tanks which vent all poisonous gases and entrapped air to a gas washer system. These tanks also equalize flow and concentration ahead of the treatment system.

Volume — Flow to the waste treatment plant is approximately 1200 gpm of which 865 gpm represents waste rinse and 350 gpm is makeup water. Most of this is free of chromium and cyanide.

The company chose a waste treatment system which concentrates dilute solutions by ion exchangers and destroys the concentrated exchanger regenerant by batch treatment. Chromium bearing rinses are treated separately

to avoid contamination of plating baths with chrome leakage through the ion exchange units. Metallic cyanide rinses are handled separately to avoid ion exchange fouling.

Reasons — Behind the choice of system were these considerations:

1. It was necessary to confine waste treatment facilities to the smallest possible space (5280 sq ft maximum). The method selected provides operating simplicity and positive control of a batch system without the bulky holding tanks usually required for batch systems.

2. Chemical operating costs, when credit is given for recovered chromic acid, are lower than for other systems considered.

3. A substantial part of the water used for plating rinses can be recovered for re-use—an important cost saving. By reducing the demand for raw water, the company makes a real contribution to conservation of the local water table and demonstrates how a large plating plant can produce quality work without excessive demands on local water.

4. It provides demineralized water needed for quality rinsing.

Five Systems—The IBM waste disposal system is actually five systems in one. These are:

1. Filters and demineralizer for general rinse treatment.
2. Demineralizer and evaporator for chrome recovery.
3. Continuous cyanide destruction.
4. Batch neutralization.
5. Sludge handling.

A master control panel provides for automatic regeneration and monitoring of systems.

Cyanide—In the heat treating department, a considerable amount of salt cake is formed in the cyanide hardening process. The molten waste (about 15 per cent cyanide in a carbonate salt) is cooled in special metal containers where it forms chunks.

The chunks are put into solution in perforated metal baskets lowered into an upflow dissolving tank equipped with an air grid for mixing. (The baskets prevent stray bits of metal from getting into the waste system.) Tank overflow is discharged to the cyanide waste system.

Idea No. 3

Operating conditions for an ion exchange installation

	Chromium		Acid Copper		Nickel	
	Cation	Anion	Cation	Anion	Cation	Anion
Metal Concentration in Waste	350 ppm (CrO_3)		750 ppm (Cu++)		450 ppm (Ni++)	
Bed Size, cu ft	20	20	12	12	6	6
Bed Diameter, in.	36	36	30	30	24	24
Flow Rate, gpm	40	40	30	30	15	15
Metal Recovery, oz per cu ft		36 (CrO_3)	12 (Cu)		18 (Ni)	
Total Through-Put, gal	16,000	16,000	1,500	1,500	2,000	2,000
Regenerant, at 10% concentration	H_2SO_4	NaOH	H_2SO_4	NaOH	H_2SO_4	NaOH
Regenerant, lb per cu ft resin	10	12	10	12	10	12
Regenerant Flow Rate, gpm	10	10	6	6	3	3
Regeneration Cycle, minutes	120	120	75	85	52	55
Backwash, gal per unit	350	350	250	250	100	100
Rinse, gal per unit	700	700	300	300	200	200

Look for Dollar Returns

By returning recovered chemicals and water to his plating plant, a manufacturer of automobile hardware realized a sizable return on his waste treatment investment

A MAJOR manufacturer of automotive hardware in eastern New Jersey found that the treatment of plating wastes by ion exchange pays off three ways. The company: 1. Recovers worthwhile quantities of plating metals and acids. 2. Solves the problem of discharging undesirable wastes into public watercourses. 3. Recovers practically all the water used for plating rinses.

In less than two years, the firm has recovered more than 16 million gallons of water through ion exchange. This supplies 20 to 40 per cent of total boiler house water (depending on the season) which ordinarily would have to be purchased.

The recovered water is completely deionized, which reduces the cost of chemical treatment of the boiler feed (the municipal supply has a 5-grain hardness). By recovering both plating wastes and water, the cost of waste treatment has been brought nearly to the break-even point.

Sprays—The plant contains six automatic conveyors for plating copper, nickel and chromium on automotive hardware. Between each plating dip are conventional water sprays and rinses to prevent drag-over. Water sprays are automatically timed to operate only when the racks are within range. Overflows from these tanks (acid copper, nickel and chromium) trickle over weirs to a sump below each tank from where the wastes are pumped to individual holding tanks. Concentrations of plating metals in the wastes average: Acid copper (as Cu) 750 ppm; nickel (as Ni) 450 ppm; and chromium (as CrO_3) 350 ppm.

The plating rinse wastes are combined with rinses from the nickel and chromium acid dips, and water from heat exchangers. Dilution is deliberately increased for two reasons: 1. The volume of rinse

run continuously between regenerations.) 2. The more deionized water produced before an ion exchange system reaches its exhaustion point and requires regeneration, the more economical this part of the recovery process will be.

Ion Exchange — The waste recovery system, designed and installed by the American Water Softener Co., Philadelphia, co-operating with Allis-Chalmers Mfg. Co., West Allis, Wis., consists of three pairs of cation and anion exchange columns, one pair for each type waste. The cation exchange columns contain Amberlite IR-120, a strongly acidic resin; the anion exchange columns contain Amberlite IRA-410, a strongly basic resin.

Before entering the exchanger columns, the wastes are pumped through activated carbon beds for filtration and removal of organic impurities. (See table for specifications and operating conditions of the system.)

Recovery—Copper and nickel are recovered on the cation exchange columns, which are operated on a hydrogen cycle. The acidic effluent from these columns then passes to anion exchange columns which adsorb the various anions, primarily phosphates, sulphates and chlorides. Chromium is recovered on the anion exchange column and the cations present in those wastes are adsorbed by the cation exchange columns.

The effluent from the three sets of columns is pumped to the boiler house. About 600,000 gallons a month are conserved, representing from one-fifth to two-fifths of the boiler feed requirements.

Adsorbed metals are recovered by regenerating the columns. Data on the regeneration cycles are in the table.

Acid — The eluted liquor from the copper-adsorbing column, which is regenerated with sulphuric acid, is copper sulphate. The acid copper plating solution normally requires daily additions of sulphuric acid, so the regenerated copper sulphate-sulphuric acid solution is returned to the electroplating bath in place of the normal acid additions.

The nickel, reclaimed as nickel sulphate by regeneration with sulphuric acid, is returned to the plating conveyors. Recycling the nickel solution back to the plating tank permits direct re-use of the nickel and reduces the quantity of water needed to maintain proper concentrations of the plating solution.

Savings—About 5 lb of nickel carbonate per 100 gallons are required to neutralize the regenerated nickel solution. Aside from this, no nickel salts have been purchased in two years for one of the plating tanks.

The chromium is recovered from the anion exchange column by regeneration with NaOH, producing a sodium chromate solution. The chromate is recovered as a precipitate of barium chromate by the addition of $Ba(OH)_2$.

The decision to precipitate the chromium rather than convert it to chromic acid was made to recover the sodium hydroxide for re-use in the next regeneration cycle (the cost of the caustic soda outweighs the value of the chromic acid that could be recovered). In addition, the barium chromate has a market value.

Small Loss — The calcium adsorbed from the rinse waters by the cation exchange resins precipitates as calcium sulphate during regeneration with sulphuric acid. It is removed by filtration before the liquor is returned to the plating conveyor. Sodium hydroxide passed during regeneration from the anion exchange columns in the copper and nickel recovery units is combined with a variety of anions. It cannot be recovered economically and is discharged to the sewer.

In addition to conserving plating metals and acid, the plant is recovering 25 per cent of the water used in plating. When plans for connecting other plating equipment to the waste treatment system are carried out, more than 60 per cent of the water will be recovered. Plans also call for reclaiming the contaminated water from other processes such as the automatic washers ahead of the plating line and the spray rinses ahead of the paint booths.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Metallurgical Research Advances

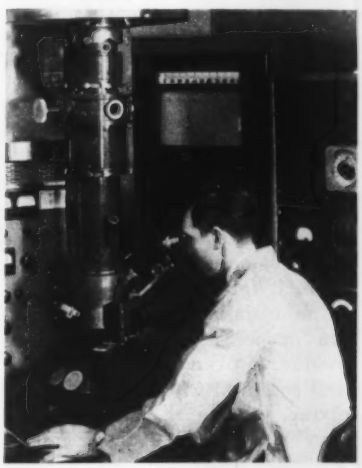
A new technique (it uses an electron microscope) permits analysis of areas a few microns in diameter

POINT probe microanalysis, a new metallurgical research technique, permits scientists at U.S. Steel's Research Center, Monroeville, Pa., to analyze areas of steel specimens 10,000 times smaller than is possible by any other method.

The technique uses an electron microscope containing a focused electron beam to excite x-ray emission from the specimen. The x-rays are analyzed by a crystal spectrometer.

Application—This method has wide application in metallurgy for the study of intergranular corrosion, analysis of segregation of alloying elements among metallic grain boundaries, measurement of interdiffusion during welding and plating and to determine composition of fine precipitate particles.

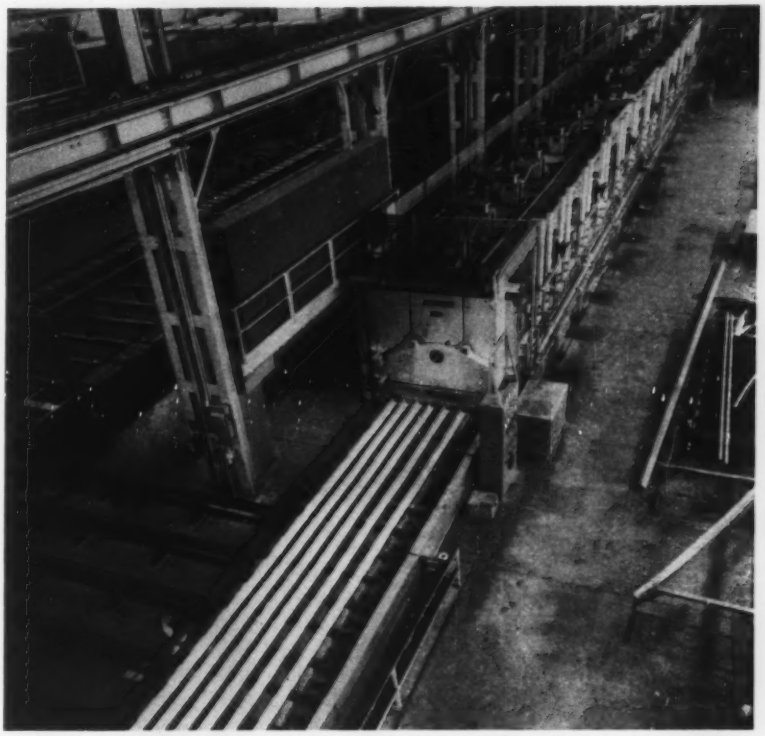
At present, the instrument is able to detect all elements with an atomic number equal to 22 (titanium) or higher.



U.S. Steel scientist focuses electron microscope on area of specimen

It can handle parts 100 ft long. Advantages over a vertical furnace: Shorter heat treat time, less work in process, improved properties and less distortion

By A. F. SNOW
Industrial Heating Department
Westinghouse Electric Corp.
Meadville, Pa.



Horizontal solution heat treating furnace with load of extrusions on charging table. Parts are transferred from extruding machinery on chain conveyor (left)

Horizontal Furnace Heats Extrusions

KAISER Aluminum & Chemical Corp., Halethorpe, Md., is solution heat treating aluminum extrusions in a horizontal, semicontinuous roller hearth furnace.

Previously, Kaiser Aluminum heat treated extrusions in vertical furnaces over vertical quenching pits. Each extrusion was wired securely to a supporting grid through a hole drilled in each piece, and the grid-supported bundle was lowered into the quench with an auxiliary hoist.

Further Handling — The load then was transferred to the furnace hoisting hook by jib cranes and hoisted into the furnace for heat treating. After heating and quenching, most of these operations were performed in reverse.

The horizontal furnace and quench were developed primarily to reduce the amount of direct labor in the vertical process.

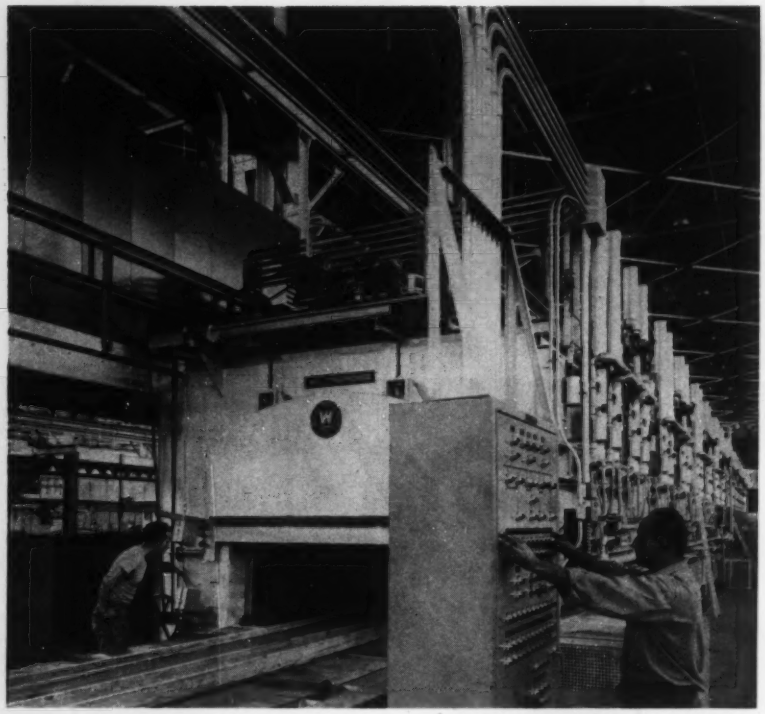
Other Benefits—The new method also cuts down the amount of "work in process," eliminates the need for a deep pit and shortens total cycle time. Variables can be controlled: Water pressure and flow, orientation of initial quench nozzles and speed of extrusion travel through the quench.

The roller hearth quench produces extrusions with improved and more uniform mechanical properties and less distortion than those treated in the vertical tank quench.

Requisite—The furnace was selected because Kaiser Aluminum planned to produce extrusions in two general lengths—50 and 85 ft. In heat treating 50-ft lengths, it was necessary to provide for individual quenching because each batch of extrusions would not necessarily be of the same section or shape.

Designed and built by Westinghouse Electric Corp., the furnace and quench line includes a charging table 103 ft long, the furnace which is 112.5 ft over-all, a 45 ft long quench which is 18 in. from the discharge end of the furnace and a runout table 104 ft long.

It is one of the few pieces of equipment in the U.S. capable of handling extrusions up to 100 ft long. The hearth is 6½-ft wide and is designed for single-layer loading directly on the rolls with



Charging end of furnace. Operator at controls is regulating speed of charge

a clear charge height of 30 in.

Operation — Extrusions are brought to the charging table by a chain conveyor. A hydraulic lift on the table raises them from the chain flights, and at the same time brings the top of the charging table rolls level with the furnace rolls.

The charge door is raised automatically and extrusions are driven into the furnace by the running charge table and furnace rolls at 50 fpm. The furnace rolls oscillate during the heating cycle. One 50-ft charge can be oscillated while a second 50-ft load is being charged.

Radiant Tubes—The furnace is rated at a maximum operating temperature of 1000°F, has a total rating of 7½-million Btu an hour. There are four gas-fired U-type radiant tubes in each of seven compartments. The quench chamber is equipped with flat spray nozzles above and below the hearth level.

Quench speed is controlled from a pulpit at the discharge end of the furnace. An electronically regulated drive accelerates the extrusions to any preset constant speed (10 to 200 fpm) before the leading end reaches the first spray.

A series of walking beams, operating at right angles to the furnace line, removes the extrusions from the runout rolls.

Heat Cycles—Heat treating time required is about half that necessary in the vertical furnaces. Cycles used vary from 3½-hours on heavy sections to 25 minutes on light sections, including soaking time.

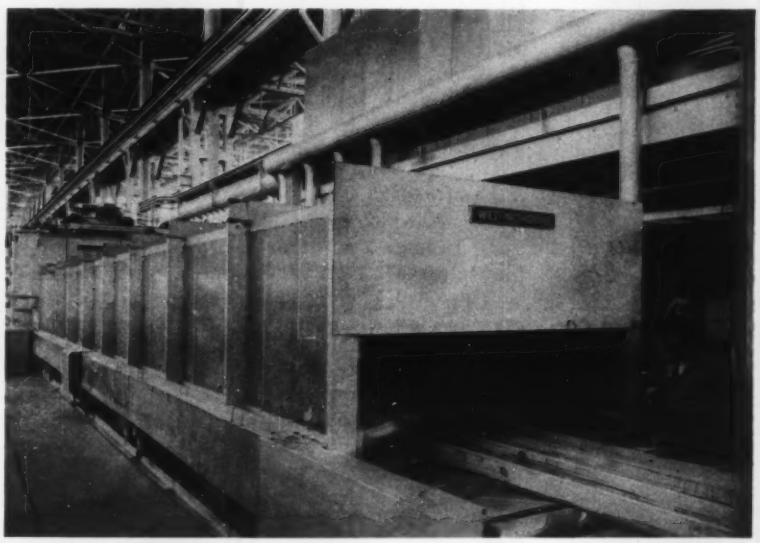
Typical cycle: A charge of 3600 lb (two loads of 1800 lb each) of small 2024 aluminum extrusions ¼-in. thick and 3 in. wide took 1.2 hours. A similar load processed in a vertical furnace would require about 2½-hours.

Workpieces — The heaviest shapes are solid pieces weighing up to 50 lb a foot and are being run in about 3½-hours. Light pieces, ⅛ x 1½ to 2 in., are being run in about 25 minutes.

Production varies from about 1500 lb an hour on the lightest, most intricate sections to as much as 10,000 lb an hour on the heaviest sections.

Aircraft Parts — Alloys 6061, 6062, 2024, 7075 and X7178 have been heat treated successfully with this equipment. Current production is almost entirely aircraft sections.

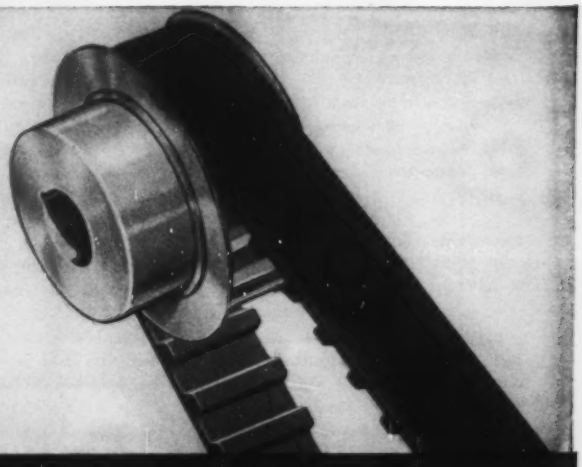
Tubing and certain complex extrusions with re-entrant angles must still be run in vertical furnaces because of quenching. Certain heavy extrusions with protruding flanges or ribbed surfaces (on which slight roll marking of 0.003 to 0.006 in. is objectionable) also are still heat treated in vertical furnaces.



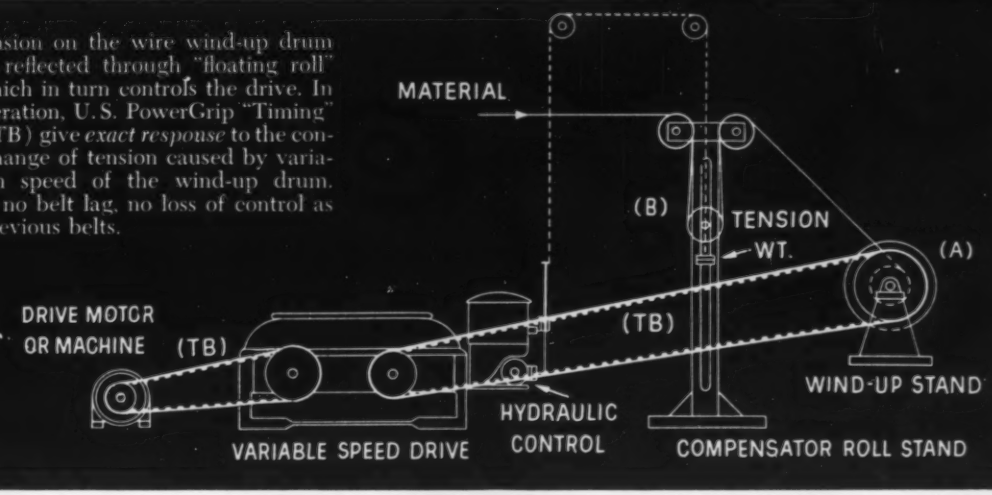
Extrusions at discharge end of quench sprays coming out onto runout rolls

US RUBBER **PowerGrip** *"Timing" Belts*

How a designer licked the wind-up problem in a highly sensitive machine



The tension on the wire wind-up drum (A) is reflected through "floating roll" (B) which in turn controls the drive. In this operation, U.S. PowerGrip "Timing" Belts (TB) give *exact respouse* to the constant change of tension caused by variations in speed of the wind-up drum. Hence, no belt lag, no loss of control as with previous belts.



The schematic drawing illustrates a "floating roll," one of the most sensitive and precise methods of controlling tension in a web of material—whether it be wire, paper, cotton, threads, plastic or strips of metal. It is one more example of U.S. PowerGrip "Timing"® Belt's ability to simplify and improve a power transmission unit . . . one of the reasons why the invention of this belt was recently awarded the Franklin Institute's Edward Longstreth Medal for "Invention of High Order."

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Slag Control Method for Sulphur Removal

Here is the oxygen refining procedure used by the Abbey Melting Shop of Steel Co. of Wales Ltd. for steel with 0.027 per cent maximum sulphur. A. J. Kesterton, superintendent of steel production, outlines it this way:

1. Prior to 30 minutes before melt, work the bath in the usual way (add oxide, hot metal, etc.) but aim for a melt carbon of about 0.50.

2. About 30 minutes before melt, send a sample to the laboratory for analysis of C, S, P and Mn.

3. About 15 minutes before melt, send a sample to the laboratory for carbon only.

4. While waiting for these samples, feed lime to the bath, if the condition is suitable. This lime counts as part of the total addition required as calculated later from the table (page 161).

5. When the bath is melted, the two bath samples should be ready. The carbon at melt can be accurately deduced from the two samples, and the sulphur at melt can be accurately estimated by deducting 0.002 per cent from the result of the first sample. Example:

1st sample, 30 minutes before melt	C	0.45	S	0.043
2nd sample, 15 minutes before melt	C	0.40		.....
At melt, therefore, we estimate	C	0.35	S	0.041

6. Now read the table to deduce the action required. In the example given, for C 0.35, S 0.041 at melt, the additions required are 8 tons of hot metal, and four or five boxes of lime.

7. Add the hot metal as quickly as possible, giving more of the lime with the hot metal, to make use of the boil.

8. Start oxygen blowing as soon as the bath subsides after hot metal addition, and send a sample to the laboratory for carbon only. This determines the volume of oxygen to be used.

9. As early as possible, add the remainder of lime required in the oxygen blow.

10. Blow oxygen at 36,000 cu ft an hour for the period specified in the table to put the lime into solution; then increase to 60,000 cu ft an hour for the remainder of the oxygen required.

11. Tap the furnace as soon as the specified oxygen volume has been delivered without sending further samples to the laboratory for carbon and sulphur analysis. But send a running-out sample to the laboratory for C, S and Mn.

12. Use fluorspar with lime additions to assist rapid solution.

Oxygen Speeds Sulphur Removal

A slag control method for open hearth refining to eliminate sulphur has been worked out by an English steel firm. Big advantage: Refining time is shorter

SULPHUR often is a complicating factor in oxygen-blown heats of open-hearth steelmaking, as well as nonoxygen casts.

Steel Co. of Wales Ltd. proposes a slag control method for sulphur removal, using oxygen as an essential tool. It has licensed its oxygen-through-the-roof process (STEEL, Feb. 11, page 112) to Kaiser Engineers, Oakland, Calif.

Results of experimental heats at the Abbey Melting Shops of the English company indicate that the required sulphur specification can be achieved by this method.

Sulphur Content — There has been no significant difference between average sulphur content in the pit samples of oxygen and nonoxygen casts. The important difference is that the same amount of sulphur is eliminated in oxygen blown casts, even though the refining time is shorter.

The Abbey furnaces operate on relatively high sulphur fuel oil (1.6 per cent), much light scrap (which lengthens charging times and sulphur pickup from the fuel) and 50 to 55 per cent of high phosphorous (0.70 per cent).

Sulphur becomes a complicating factor when steel specifications call for less than 0.03 per cent sulphur.

Removal Rate—The extent of the problem depends on the sulphur content at melt in relation to the tapping specification. If the sulphur at melt is close to the final specification, the carbon may be removed at high speed by using oxygen.

If the final specification is low and difficult to attain (less than 0.027 per cent) and the sulphur content at melt is relatively high (0.04 to 0.045 per cent or more), the bath must be refined—primarily to remove sulphur. Carbon elimination must be subordinated.

Variables—The sulphur content at melt will vary because of pickup from the fuel, the condition of the scrap, variations in hot metal analysis, analyses and quantities of flush slag and carbon per cent melt-outs. The extent of the refining problem is not known until melt-out, or close to it.

If sulphur content is higher than specification, the capacity of the slag to remove sulphur must be increased during refining. The difference between the melt sulphur and the final specification determines the amount of lime to be added. This is the only convenient addition that can be made deliberately to the slag to increase its total sulphur carrying capacity.

Must Dissolve — The lime first must be put into fluid solution in the slag, then there must be adequate slag/metal interfacial exchange or agitation to insure that the sulphur is transferred from metal to slag.

To dissolve, the lime must absorb

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LEFT FOREGROUND — Conveyor table for rod or tube.

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Harper's Bazaar Photograph

Sulfuric Acid
Hydrochloric (Muriatic) Acid
Nitric Acid
Hydrofluoric Acid
Sodium Fluoride
Sodium Bifluoride
Trisodium Phosphate
Sodium Metasilicate
Oxalic Acid
Fluoboric Acid
Potassium Fluoborate

Sodium Fluoborate
Ammonium Fluoborate
Lead Fluoborate
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heat to raise it to slag temperature. A thorough mixing with the slag is necessary to facilitate solution. The best procedure is not an all-out attack on the carbon with oxygen. The lime should be helped into solution by a combination of a reasonable time exposure to the flame, coupled with a carbon boil vigorous enough to insure all the lime is continuously surrounded by moving slag.

Oxygen Rate — These requirements should be met by blowing with oxygen at a moderate rate initially without loss of carbon. In the Abbey furnaces, a rate of 36,000 cu ft an hour is used. The time the moderate blowing rate is maintained to get the lime into solution is proportional to the addition made, and hence to the melt sulphur content.

A quantity of carbon will be blown out at this stage, which is proportional to the volume of oxygen used at this rate.

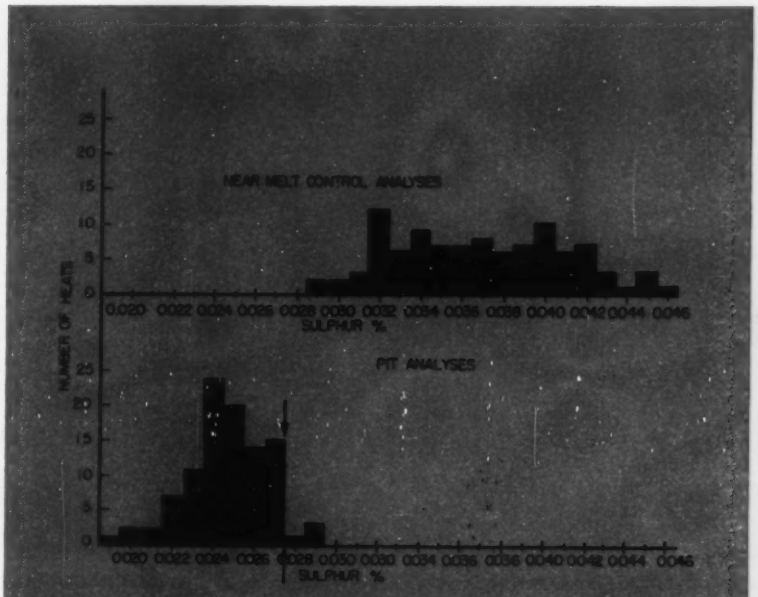
After the lime dissolves, the slag and metal must be further agitated to provide an adequate amount of slag/metal interfacial exchange for completing the sulphur transfer.

Carbon Content — Because the slag is fluid and reactive at this stage, the agitation may be provided rapidly by stepping up the oxygen rate to 60,000 cu ft an hour. The carbon will be getting lower and a higher rate of blowing is needed to maintain a comparable rate of agitation.

There must be available at the melt, an amount of carbon proportional to the melt sulphur content, which will put the necessary lime into solution and then adequately agitate the slag with the metal. If this carbon is not present, it should be added by hot metal.

Quality—At the Abbey Melting shop, oxygen is used for making low carbon steel sheet, including the highest qualities of extra deep drawing and fully stabilized steel, with no difference in quality as compared with previous practice.

Oxygen-blown steel for tinplate pickles well and has a lower than average hardness for the hot rolled



Of 100 heats refined by the slag control method, 96 were within the 0.027 per cent sulphur specification. Hot metal additions were made to 33 per cent of the heats as part of the process

Guide to Hot Metal and Lime Additions

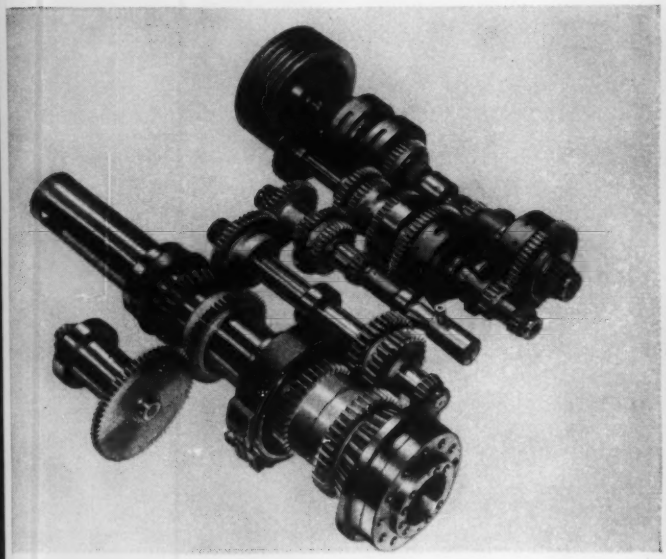
(maximum sulphur 0.027 per cent)

Sulphur at Melt	Carbon at Melt	Add Hot Metal Tons	Feed Lime Boxes	Total Req'd cu ft	OXYGEN Flow Rates At 36,000 cu ft/hr	At 60,000 cu ft/hr
0.05	0.50	6	5-6	As		
0.05	0.45	9	5-6	required		
0.05	0.40	12	6	by carbon	27,000 cu ft	Remainder
0.05	0.35	14	6	after		
0.05	0.30	15	6	hot metal		
0.05	0.30*	Divert		is added		
0.045	0.45	5	5	As		
0.045	0.40	8	5	required		
0.045	0.35	11	5-6	by carbon	24,000 cu ft	Remainder
0.045	0.30	13	6	after		
0.045	0.25	15	6	hot metal		
0.045	0.25*	Divert		is added		
0.040	0.45	Nil	4-5	As		
0.040	0.40	5	4-5	required		
0.040	0.35	8	4-5	by carbon	21,000 cu ft	Remainder
0.040	0.30	10	5	after		
0.040	0.25	12	5	hot metal		
0.040	0.20	15	5	is added		
0.040	0.20*	Divert				
0.035	0.45	Nil	4	As		
0.035	0.40	Nil	4	required		
0.035	0.35	5	4	by carbon	18,000 cu ft	Remainder
0.035	0.30	8	4	after		
0.035	0.25	10	4-5	hot metal		
0.035	0.20	12	5	is added		
0.035	0.15	15	5			
0.030	0.45	Nil	3	As		
0.030	0.40	Nil	3	required		
0.030	0.35	Nil	3	by carbon	15,000 cu ft	Remainder
0.030	0.30	Nil	3	after		
0.030	0.25	6	3	hot metal		
0.030	0.20	9	3	is added		
0.030	0.15	12	4			

*Less than

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

WANT MORE POWER, MORE SPEEDS?



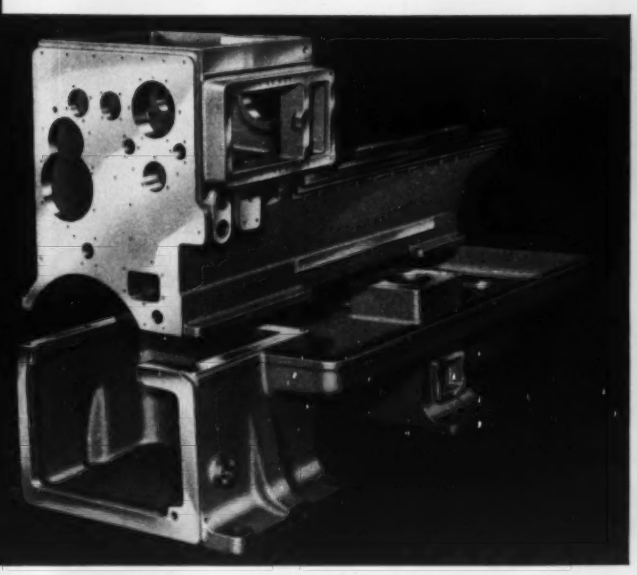
NEW HEADSTOCK GEAR TRAIN—sixteen different spindle speeds available, powered by up to 30 h.p. single-speed driving motor delivering full power at all speeds. Spindle is mounted on selected pre-loaded, precision-tapered roller bearings. Heavier, more rugged design provides smoother, quieter power.

HYDRAULIC SPEED SELECTOR—smooth, effortless speed changes. No waiting, no computing, no stopping of spindle, no releasing of main drive clutch. Operates direct or pre-set. Hi-Lo Lever permits instantaneous speed changes in 8:1 ratio without moving Speed Selector handwheel. Multiple Disc Clutches have automatic take-up for wear.

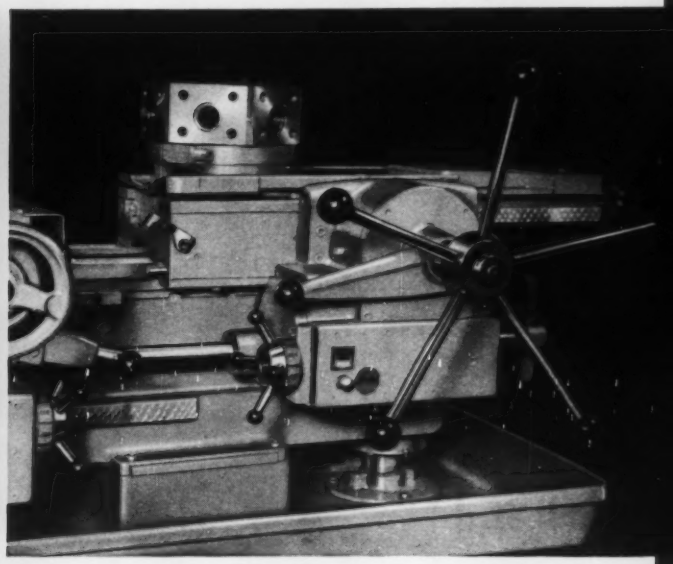
YOU GET THEM ALL...PLUS

NEW GISHOLT MASTERLINE

WANT HEAVY CUTS WITHOUT VIBRATION?



NEW HEADSTOCK AND BED CASTING—scientific design dampens out vibrations, assures smooth operation and simplifies holding closer tolerances. Made from semi-steel, poured in Gisholt's own foundry. Greater swing over ways permits bigger chucks and broader range of workpiece sizes. Provides a solid foundation for all types of work.



NEW TURRET RAM AND SADDLE—designed wider, heavier, more rigid to handle increased capacity and higher speeds. Dial-type feed selector makes feed changes faster, easier. Turret ram rigidly supported on 64-66 Rockwell C alloy steel way strips. Power transmitted through serrated tooth clutches, with shear pin protection against overloading.

GREATER VERSATILITY...WITH THE

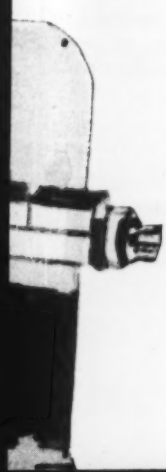
RAM TYPE TURRET LATHE

YOU'LL SPEED UP your production jobs—both large and small—with this more powerful, more versatile Gisholt MASTERLINE Ram Type Turret Lathe.

Here is a machine designed from end-to-end for easier setups, faster change-over and higher productive output than ever before. Check the advanced features illustrated above. Note the reserve power to handle your heaviest cuts—and to meet your tooling requirements of tomorrow. Note the extra spindle speeds—all at your operator's finger tips, without computing—for faster, better turning of any type material. And look over the new massive design, the over-all ruggedness that permits greater accuracy, closer tolerances, deeper cuts at punishing feeds without vibration.

Find out now how this powerful, flexible Gisholt MASTERLINE Ram Type Turret Lathe can reduce floor-to-floor time on your specific jobs. Call your Gisholt Representative today—let him show you how this advanced machine can fit most profitably into your production picture. Or write direct to Gisholt for the new literature described below.

READY NOW—all-new, 18-page illustrated Bulletin No. 1174-B, covering features, accessories, tools and floor plans on new Gisholt MASTERLINE Ram Type Turret Lathes. Ask for it!

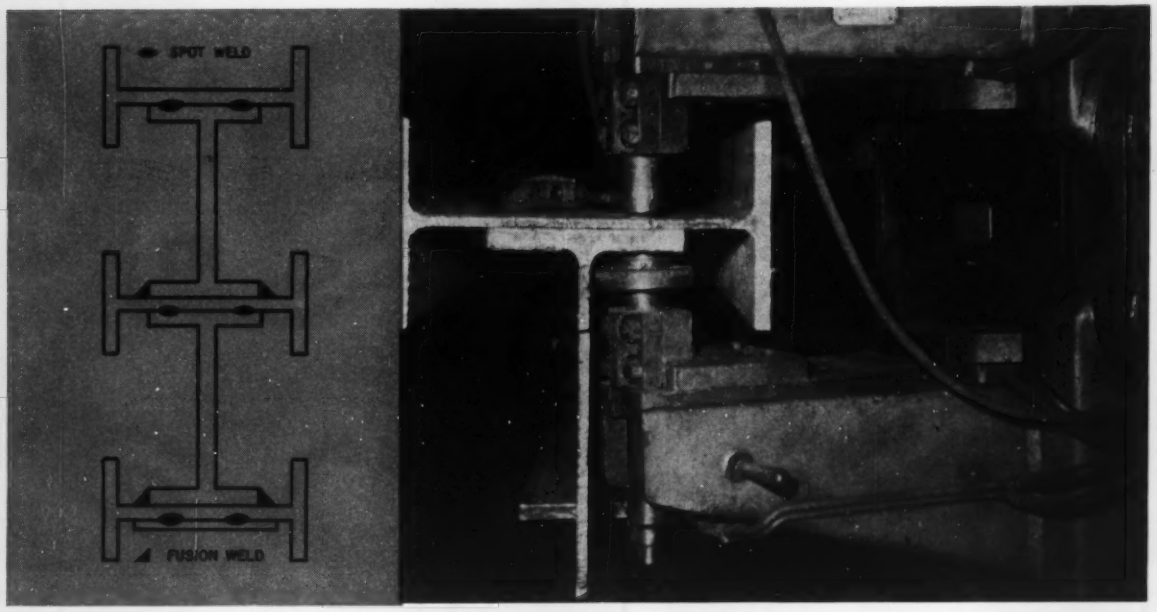


GISHOLT

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

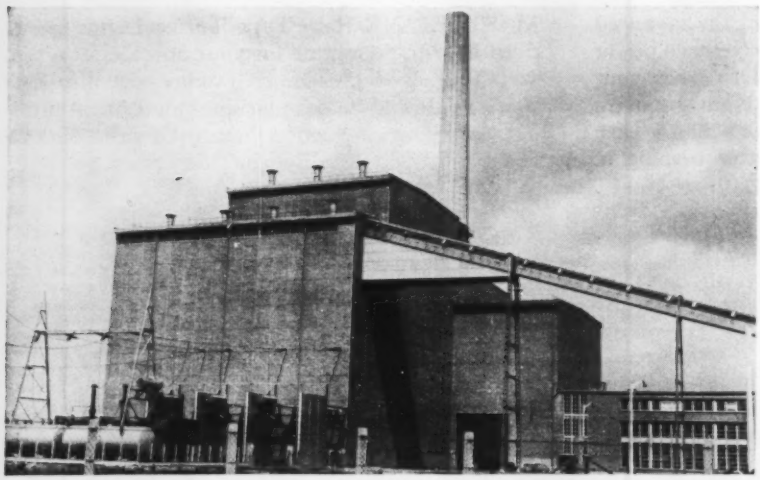


Spotwelder joins a ½-in. web to a 1¼-in. flange. This model can exert 14 tons of pressure on the electrodes. Typical assembly is shown at the right

French Firm Spotwelds Its Structurals

IF you're convinced that spotwelding is limited to parts which can be carried easily to the welder, consider the assembly in the illustration above. It's one of the structural supports for a 120,000-kw power station near Violaines, France.

The lower flange is about 1¼-in. thick; the upper web is a little thicker than ½-in. The new structural is somewhat lighter than conventional types, partly because bolt and rivet heads and nuts are eliminated. It's a trend that's making progress in steel-hungry Europe.



This is the completed 120,000-kw power plant at Violaines, France. Firm that supplied structurals says spotwelding cut costs, saved steel

Savings—Enterprises Metropolitaines & Coloniales, Rouen, France, wanted a way to cut fabricating costs of structurals. After extensive tests, its engineers decided that spotwelds could be combined effectively with regular arcwelds.

The welding machine they chose (a Sciaky) is a semiportable that's moved around the shop by crane. It's rated at 450 kva with 220 volt, 50 cycle, 3 phase current, and will weld joints up to 2⅛-in. thick. It can be mounted on temporary supports next to the work.

Construction—A typical beam in the power plant is almost 69 ft long. It is part of an assembly 131 ft long which weighs more than 45 tons. There are about 182 spotwelds in the assembly; the thicknesses of all parts joined are either ½-in. or 1¼-in.

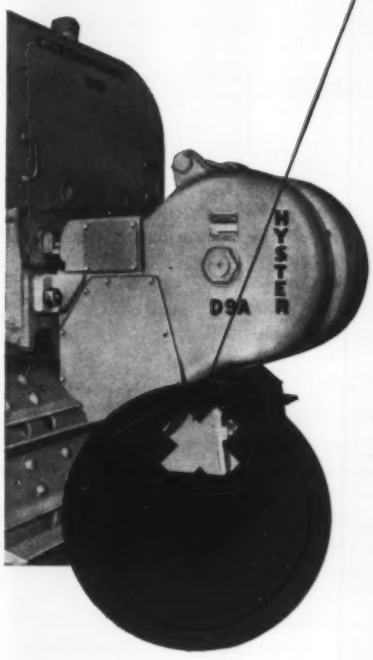
Here is the sequence: A row of

Hyster "98" Logging Arch and D9A Towing Winch especially designed for operation with Caterpillar D9 tractors.

by switching to

OSTUCO TUBING

here and here...



Hyster Company Makes Double-Cut on Costs!

Hyster Company, Portland, Oregon, out to beat machining costs of components in their logging arches and winches and a drawbar bracket, turned the trick by switching from another material to OSTUCO Seamless Steel Tubing.

Drawbar Bracket—Use of OSTUCO Tubing cut material and machining costs from $120,500 to $81,820 annually for a reduction of 32%.

Logging Arch—Used as sleeves in the Hyster "98" Arch, OSTUCO Tubing reduced material and manpower costs 10% annually.

In addition, Hyster engineers report the equipment is stronger and better able to take the strain of heavy hauling and winching jobs over rough logging terrain.

Perhaps you have hidden profit-robbers in your product. Better contact OHIO SEAMLESS for recommendations . . . without obligation on your part, of course.

OSTUCO TUBING

MANUFACTURED IN
SHELBY, OHIO
EXCLUSIVELY BY

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OF COPPERWELD STEEL COMPANY

SHELBY, OHIO • Birthplace of the Seamless Steel Tube Industry in America
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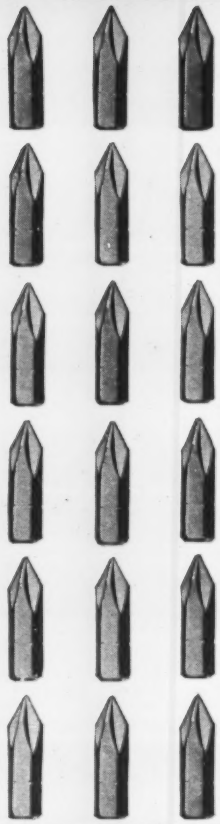
eighteen identical APEX insert bits...

Here are eighteen Apex 440-2 insert bits for No. 2 Phillips recess.

Each bit fits perfectly into the screw head recess, gets a firm purchase to drive the screw smoothly and easily.

Every bit is precision-built of special shock-resisting steel, and is notched at the hex corners to accept the patented bit retaining ring found only in Apex bit holders.



...for eighteen different screwdriving jobs

These eighteen Apex insert bits are identical, except that each one has been hardened through one of three basically different heat treatments, then tempered to meet one of eighteen totally different application requirements. These varying degrees of tensile strength and Rockwell C hardness provide the proper combination of toughness and hardness, insure greater resistance to impact, fatigue and wear. That's why Apex bits last longer, drive more screws, help reduce screwdriving costs.

Selection of the correct Apex bit for a specific screwdriving application is controlled through the complete records Apex maintains on each customer's requirements. You can select Apex insert bits exactly tailored to your requirements, to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head or Socket Head screws. Apex—the authority on fastening—offers a complete range of screwdriving tools for manual or power operation. Write on your company letterhead please, for Catalog 21.

APEX

THE APEX MACHINE & TOOL COMPANY

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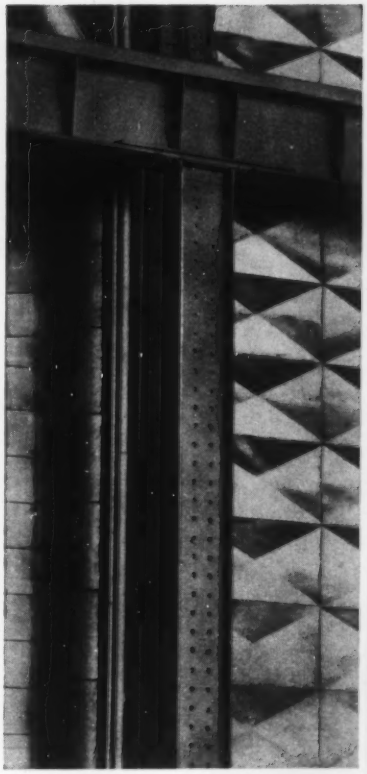


If you look closely at the column, you can see the double row of spotwelds which join it to two others. Assembly is made of five I-beams (three are visible)

spots is made from the middle of the column to the end. The welder returns to the middle and completes the seam to the opposite end. A second row is made in the same way.

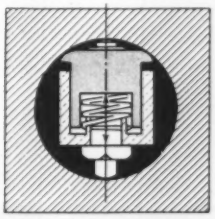
Change — The welder was first suspended from a crane. Beam elements were mounted on a dolly and indexed with a winch. Indexing each spot took 8 seconds.

To increase production, Enterprises engineers replaced the winch-driven dolly with two carriages mounted on rails. One of the carriages is powered and operated by remote control. The welder is supported by a chain fall and a temporary stand. The operator controls weld sequence and carriage movement from a platform opposite the welder.

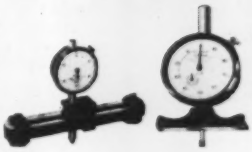
The move cut indexing time in half. Each beam can now be welded in less than 2 hours, including setup time.

Precision Requires Special Treatment

...AND GETS IT WITH FEDERAL DIAL GAGES!



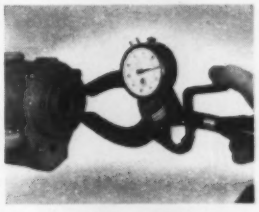
MODEL 1250 SERIES
Positive Centralization. Set directly to Gage Blocks or Micrometers. 4 sizes cover all diameters.



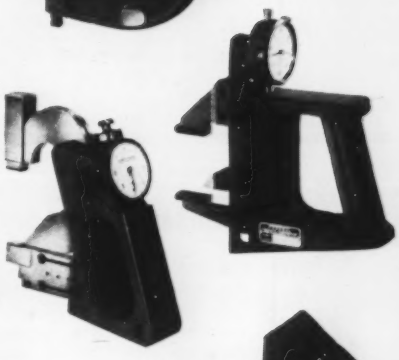
DEPTH GAGES
All types—knife edge, long range, special anvils and special types.

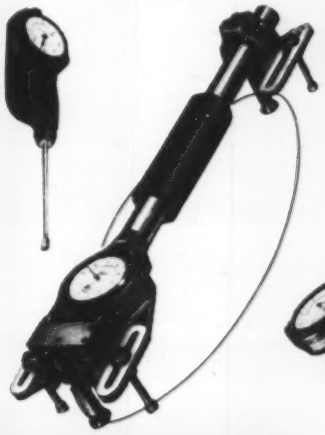
GAGES CAN BE MODIFIED SPECIALLY TO SUIT . . .

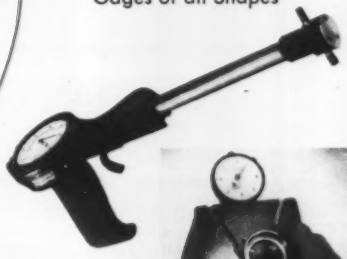
OVER 12 *TYPES* OF SNAP GAGES — *in all sizes . . .*



Stock and Special Caliper Gages of all Shapes







GROOVE GAGES
I.D. • O.D. • Depth
Concentric • Width

OVER 12 *TYPES* OF HOLE GAGES — *in all sizes . . .*

If you are not kidding yourself about Precision you know you have to gage a dimension a certain way if you want an accurate measurement.

That's why good gage users know that just *any* gage is *not* good enough. And that is why Federal makes so many different types of gages of the same general kind.

There are all degrees of accuracy required and Federal takes the care to obtain that accuracy.

And some need more gaging pressure, and some less, and some need narrow anvils and some need wide. Some want to gage just a hole diameter and some want to know if it's round or if it tapers.

MANY OTHER TYPES
Send for Catalog. Illustrates the most extensive line available.

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Whatever You Need in Gages —

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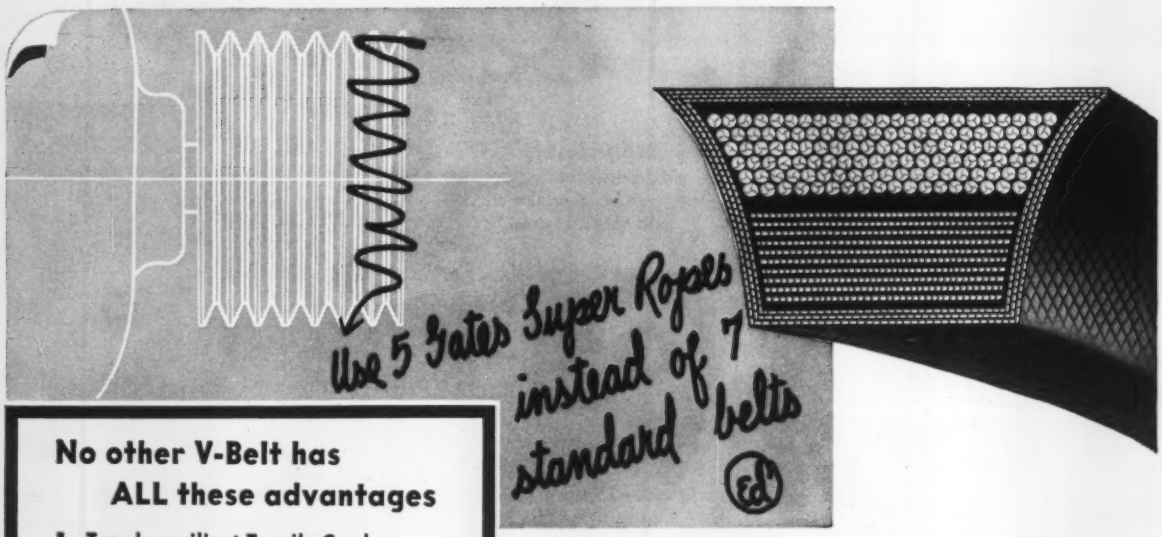
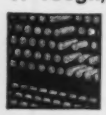
Get more HP delivered per $ of drive cost



No other V-Belt has ALL these advantages

1. Tough, resilient Tensile Cords



Super-strength tensile cords provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required . . . save weight and space.

2. Concave Sidewalls (U.S. Pat. 1813698)

Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . far longer belt life.

3. Flex-Weave Cover (U.S. Pat. 2519590)

A Gates exclusive provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . . more power available to driven machine.

4. High Electrical Conductivity

Built into Gates Super Vulco Ropes for safer drives (in explosive atmospheres).

5. Oil, Heat, Weather Resistant

Special rubber compounds make Super Vulco Ropes highly resistant to heat, oil, and prolonged exposure.

Cut sheave width and weight with Gates Super Vulco Ropes

You save on cost of iron . . . you reduce bearing width and support . . . you save space and overall cost . . . when you design a drive using Gates Super Vulco Ropes. Here's why:

5 Gates Super Vulco Ropes do the work of 7 standard V-belts

That's because Gates Super V-Belt has 40% more horsepower capacity than standard belts. Therefore, you can reduce sheave width and weight . . . cut cost.

A wealth of drive data is quickly available to you. Simply call your nearby Gates V-Belt Distributor (see 'phone book yellow pages) for a Gates V-Belt specialist. Stocks available in industrial centers around the world. The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

The Mark of Gates Specialized Research

TFA 91 A

Gates Super VULCO ROPE Drives

Automobile engines with high compression ratios and high octane gasolines contribute to higher operating temperatures which lower valve life. A new steel for modern engines keeps pace with design

Analysis of Valve Steel Alloys

	C	Mn	Si	Cr	Ni	Fe	N_2	Other
SAE 3140	0.4	0.8	0.3	0.7	1.3	Bal		
Silcrome XB	0.8	0.4	2.0	21.0	1.5	Bal		
Silcrome 1	0.5	0.4	3.3	8.5	—	Bal		
Silcrome XCR	0.4	1.0	1.0	23.5	5.0	Bal		2.8 Mo
Silcrome 10N	0.4	1.1	3.0	19.0	8.0	Bal	0.20	
21-12	0.2	1.3	1.0	21.0	11.5	Bal		
21-4N	0.5	9.0	0.2	21.0	4.0	Bal	0.40	

Nitrogen Improves Valve Steel

THE search for a better engine valve has led metallurgists to a new, high - nitrogen, austenitic steel: 21-4N.

It's hard and strong at high and room temperatures, and it resists corrosion well. Most important, the steel withstands creep, a factor which contributes greatly to valve failures.

Maker — M. J. Tauschek, chief engineer, Thompson Products Inc., Cleveland, reports that his firm makes valves from the new alloy under the specification VMS 201. They are used in high compression engines which can burn aviation-type gasoline.

Temperature tests at Thompson show that valves can reach 1600°F in heavy duty truck service, although 1300°F is more usual in passenger cars. Such temperatures cause corrosion and burning, a factor which has restricted the durability of many engines.

According to Mr. Tauschek, no one is sure how much any one element in exhaust gases contributes to corrosion. Fuel and oil additives have some effect, but sulphur and free oxygen are also important. Deposits impair heat transfer and may lead to solid state reactions and corrosion.

Not Resistant—The popularity of large silicon additions in valve steels like Silicrome 1, 10 and XB was the result of improved oxidation resistance. Recent research shows that silicon in concentra-

(*Please turn to page* 172)

Tensile Data (Short-Time Exposure)

	21-4N			
	Room Temp	1200°F	1400°F	1600°F
Ultimate strength, psi	163,000	86,000	62,000	38,000
Yield strength, 0.2% set psi	104,000	48,000	37,000	25,000
Elongation, % in 2 in.	9.0	16.0	18.0	27.0
Reduction in area, %	9.0	23.0	25.0	39.0
		Silcrome 10N		
Ultimate strength, psi	143,000	76,000	49,000	29,000
Yield strength, 0.2% set psi	75,000	45,000	33,000	20,000
Elongation, % in 2 in.	19.0	13.0	15.0	10.0
Reduction in area, %	15.0	17.0	21.0	14.0

HEAT TRANSFER EFFICIENCY is increased in this Marquette Cement Manufacturing Company kiln at Cape Girardeau, Missouri, by installation of Republic Kiln Chain. Slurry of limestone and clay clings to chain as kiln rotates. Drying is speeded by exposing more slurry to hot gases from firing end of kiln, plus direct heat transfer from heated chain.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

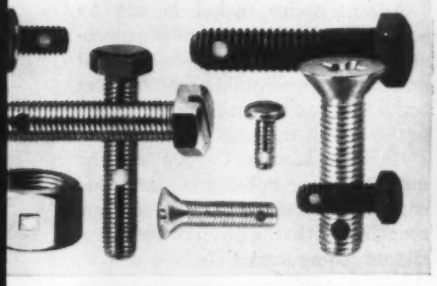
REPUBLIC CHAIN

combats heat and abrasion torture

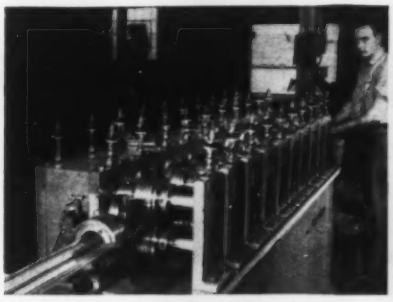
One of the world's toughest chain applications is its use in modern cement kilns. Here, continuous operation at temperatures up to 750°F, in a grinding slurry of crushed limestone, clay and other abrasive materials, demands the ultimate in chain strength and toughness. And, because cement manufacturing is a continuous process, maximum wearability is essential. Costly shutdowns for chain replacement must be held to a minimum.

Republic Kiln Chain, shown partially installed, on the opposite page, is fully equal to this demanding service. Combining high strength and toughness, plus extreme heat and abrasion resistance, it is available in all popular patterns made from a complete selection of materials.

Whatever your original equipment or application problem, the best first step toward a solution is to call your Republic Bolt and Chain Division Representative. He is backed by a complete selection of chain products, fittings and accessories. Types include fire welded, electric welded, and weldless; available in high carbon, low carbon, alloy and stainless steels and wrought iron. Or, for illustrated literature, mail coupon.



REPUBLIC NYLOK® FASTENERS COMBAT VIBRATION whether seated or not. Nylon pellet imbedded in bolt or nut forces tight metal-to-metal lock between opposite threads and mating threaded member. This locking technique also provides excellent adjustment and reusability characteristics. Nylok Bolts and Nuts eliminate extra locking devices — can be hand or power wrenched. Send coupon for further information.



REPUBLIC ELECTRO PAINTLOK® DEFIES FORMING TORTURE, as demonstrated by this multiple-bending operation required in fabricating acoustical-ceiling fastening members. The special, chemically-treated zinc surface won't crack, flake or peel off under any operation permitted by the basic steel sheet. Result is a superior final finish. Even if scratched through, the coating limits corrosion to point of damage.

REPUBLIC HIGH STRENGTH STEEL COMBATS CORROSION in pleasure cruisers built by Roamer Steel Boats, Division of Chris Craft Corporation. Strength and shock resistance of steel increase seaworthiness and provide maximum safety in event of collision with submerged objects. Beyond greater corrosion resistance, as compared to ordinary carbon steel, use of Republic High Strength Steel eliminates unnecessary hull weight and provides fine weldability.

REPUBLIC STEEL CORPORATION
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☐ Chain Products ☐ Electro Paintlok Sheets
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and Steel Products

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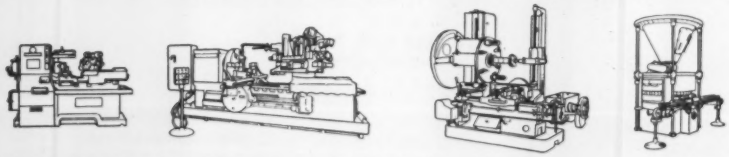
SAVED 85% . . .

. . . OF MACHINING TIME ON ONE PRODUCTION RUN, 55% on another, and *more* than paid for itself in *just one year!* These are the facts the York Corporation reports about the Potter & Johnston 3-U Automatic Turret Lathe purchased as a cost reduction measure. Success stories like this typify the cost-saving performance that manufacturers everywhere have come to expect when they replace with truly modern P&J Automatics, designed and built to meet today's *and* tomorrow's production needs! And there's a P&J Automatic Turret Lathe for every work size requirement. Write for complete information. Potter & Johnston Company, Pawtucket, Rhode Island.

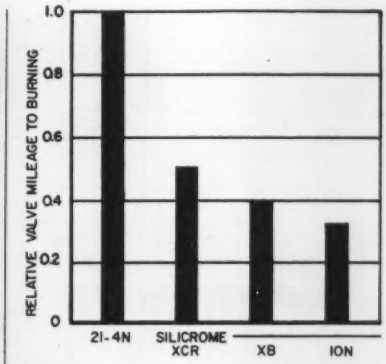


AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

PRECISION PRODUCTION TOOLING SINCE 1898



Here is how 21-4N compares with three other steels. Valves were field tested in commercial truck engines. (Mileage is indicated in millions.)

NITROGEN . . .

tions greater than 0.25 per cent reduces corrosion resistance particularly in the presence of lead oxide.

Low silicon (less than 0.20 per cent) is the important difference of 21-4N. Some may object that low silicon contributes to increased oxidation, but Mr. Tauschek points out that chromium concentrations greater than 20 per cent provide ample resistance.

Adding more nickel is not an economical way to inhibit corrosion. Research has shown that you can get acceptable results from some chrome-manganese alloys without any nickel.

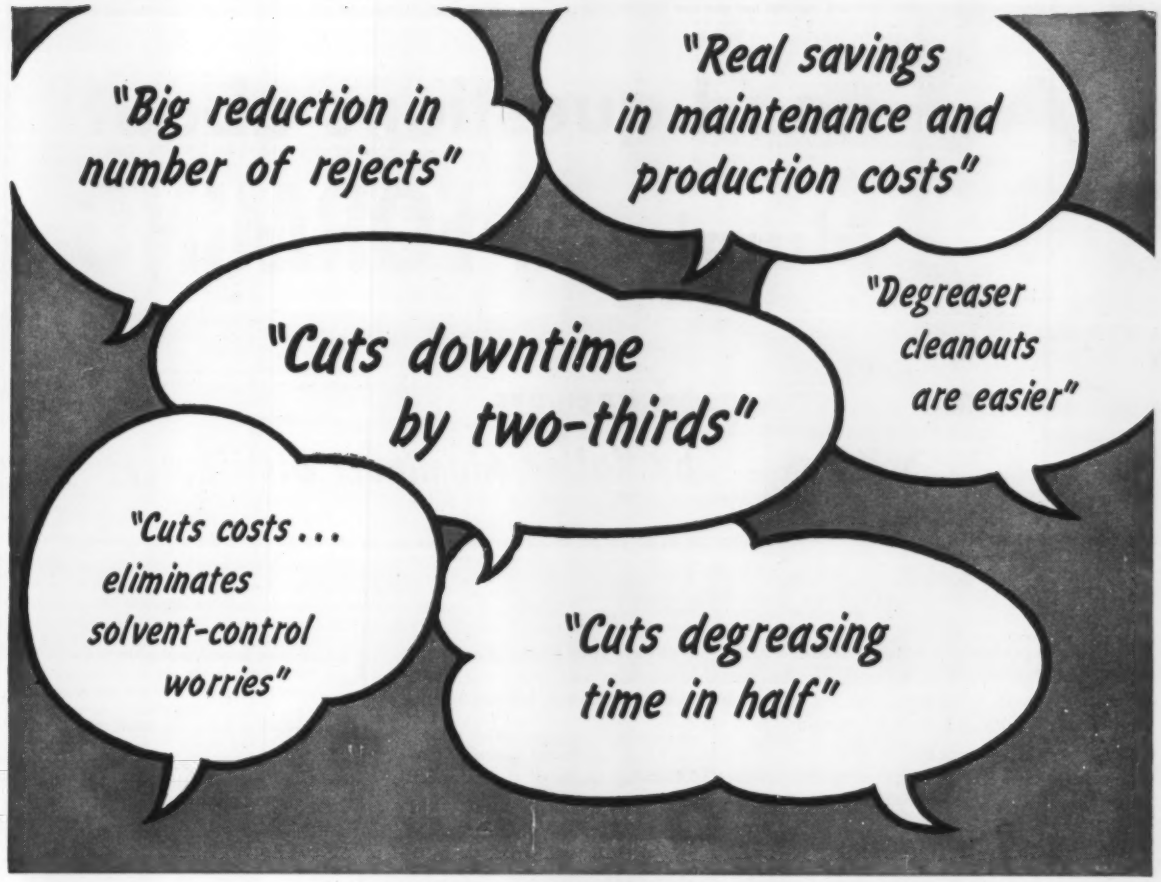
General Motors Corp.'s Al-Dip, metallizing or hot dip coatings aid corrosion resistance. Aluminum reacting with the iron forms a resistant compound.

Treatment—Operating temperatures are becoming so high that ferritic and phase hardening steels have quite limited futures. Austenitic steels are frequently heat treated to improve their performance.

In the treatment of 21-4N, it is solution treated for 1 hour at 2150°F, then water quenched to obtain maximum solution of carbides. This improves creep resistance.

The steel is aged by heat treatment and air cooled to precipitate the carbides.

Field engine tests of the new valves showed no failures after 1 million miles. Over the same period, there were six failures of valves made from 21-12 steel.


"Big reduction in number of rejects"
"Real savings in maintenance and production costs"
"Cuts downtime by two-thirds"
"Degreaser cleanouts are easier"
"Cuts costs... eliminates solvent-control worries"
"Cuts degreasing time in half"

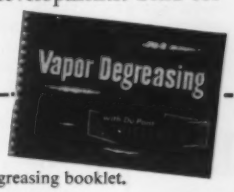
Here's why TRICLENE D is used for fast, thorough vapor degreasing

These statements represent the kind of degreasing results you can expect from "Triclene" D trichlorethylene. Manufacturers of products as different as automotive accessories, sporting goods, refrigerators, locks and builders' hardware—all users of "Triclene" D—made these comments.

They use it to clean grease and oil from all types of metals with every degree of surface polish. Users note that time between cleanouts is extended, and cleanouts are far easier. "Triclene" D maintains brighter cleaning—distillation after distillation—job after job.

Heat, light, air, acids and aluminum chloride will not affect "Triclene" D with its locked-in stabilizers. "Triclene" D trichlorethylene retains its original purity longer—contains nothing to harm even the most carefully machined surfaces. Yet it costs no more than other degreasing solvents!

Get all the facts on vapor degreasing. Du Pont's new book contains forty-two pages of data and illustrations on the latest metal-cleaning developments. Send for your copy—without obligation—today.



TRICLENE® D
TRICHLORETHYLENE

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department S-2
Wilmington 98, Delaware

☐ Please send me a copy of your new vapor-degreasing booklet.
☐ Please have your Representative phone for an appointment.

Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____

6 good questions about aluminum FORMING

...and 6 good answers by Kaiser Aluminum Distributors

If you have a problem in forming aluminum, the chances are your *Kaiser Aluminum Distributor* can help you solve it. He has metal know-how and experience with many fabricating operations. Use his fund of technical knowledge, backed by the engineering ability of Kaiser Aluminum's field staff.

Here are the answers Kaiser Aluminum Distributors have given on specific forming questions asked by aluminum fabricators in various parts of the country. Questions such as these may also be bothering you.

Q. Is it possible to anneal aluminum between forming operations?

A. When aluminum has been cold-worked to the point that further work is not practical, it is then possible to partially anneal it before continuing the forming. With aluminum, annealing must be carefully controlled in order to assure adequate workability. It is suggested that we help you work out a fabrication procedure during your planning stage.

Q. Is tooling for aluminum the same as for steel products?

A. Tools for aluminum must be of better quality than those normally used for steel products. Hardened steel should be used wherever possible in dies and on the tool surfaces that form aluminum. Cast iron tools are not recommended because of surface voids into which the aluminum can be forced, with probable "pick-up" and scatches resulting. A mirror finish on tool surfaces is recommended.

Q. What lubricant would you recommend for light forming operations?

A. For simple operations, where heavy pressures are not involved, there are a variety of soluble mineral oils that can be used. Frequently dry cake paraffin is successful. Keep in mind that mineral oils do not have sufficient slip or lubricity where heavy pressures are necessary. Vegetable oils or tallows are required.

Q. What clearance between punch and die should I use to shear aluminum cleanly with minimum burr?

A. For aluminum in the soft condition, of normal thicknesses (.010 to .060), use a clearance of 10 per cent of the thickness of the metal. For hard tempers or heat-treated alloys this clearance can be increased to 12 or 13 per cent. In shearing light gauge (foil to .010) clearance may vary from 0 to 8 per cent depending on the thickness and temper of the metal.

Q. When bending or drawing aluminum how can I determine the amount of cold work the metal can take?

A. You will find tables in aluminum handbooks showing the minimum radius allowable for making 90° bends for various alloys. (See page 38, Kaiser Aluminum *Forming and Bending Handbook*.) As the alloy, temper or gauge changes, so does the amount of cold work that can be absorbed by the metal without fracture. The higher the initial elongation, the greater the ultimate deformation. (For draw reductions, refer to pp. 21 & 22 of Kaiser Aluminum *Forming and Bending Handbook*.

Q. We've found that aluminum under pressure tends to seize to the die surfaces. How can we correct this?

A. Construct the die surfaces of hardened tool steel with a high polish. Also, use a lubricant that has sufficient body and slip to prevent scoring or scratching the product.

* * *

For the *right* answer, ask your Kaiser Aluminum Distributor

Kaiser Aluminum Distributors have helped hundreds of fabricators find the answers to difficult problems. Whether it's selecting the right material for a particular job, suggesting more economical methods of operation, or solving complicated production problems, your Kaiser Aluminum Distributor is ready to give you instant assistance.

For useful up-to-date forming information send for Kaiser Aluminum's *Forming and Bending Handbook*. Simply send your request on your letterhead to Kaiser Aluminum & Chemical Sales, Inc., Industrial Service Division, Dept. FB, Palmolive Bldg., Chicago 11, Illinois. Your *Forming and Bending Handbook* will be sent to you immediately free of charge.

Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

Kaiser Aluminum Distributors

GIVE YOU PROMPT SERVICE

ATLANTA, GEORGIA
Warehouse Division, Atlantic Steel Co. Phone: Trinity 5-3441
BALTIMORE, MARYLAND
Hill-Chase Steel Co. of Maryland Phone: Peabody 2-7300
BEAUMONT, TEXAS Standard Brass & Mfg. Co. Phone: 4-2641
BOSTON METROPOLITAN AREA
Hawkridge Bros. Co. Phone: Hubbard 2-8600
Zurbach Aluminum Co. Phone: Monument 6-1400
BRIDGEPORT, CONNECTICUT A. R. Purdy Co., Inc. Phone: Edison 6-3531
CHICAGO METROPOLITAN AREA
Fullerton Steel & Wire Co. Phone: Merrimac 7-2700
Korhumel Steel & Aluminum Co. Phone: Ambassador 2-6700
Evanston, Illinois
Miratile Mfg. Company Phone: Hudson 8-4000
(Serves House Trailer Industry only)
U.S. Steel Supply Div.—United States Steel Corp. Phone: Brunswick 8-2000
CINCINNATI, OHIO Morrison-Drabner Steel Co. Phone: Wabash 1-4480
CLEVELAND, OHIO
Copper & Brass Sales, Inc. Phone: Endicott 1-6757
Osco Steel Co. Phone: Broadway 1-2425
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Delta Metals, Inc. Phone: Lakeside 6-7443
Earle M. Jorgensen Co. Phone: Riverside 1761
DAVENPORT, IOWA Nichols Wire & Aluminum Co. Phone: 3-1895
DENVER, COLORADO ABC Metals Corp. Phone: Acoma 2-0633
DETROIT, MICHIGAN
Alloy Steels, Inc. Phone: Texas 4-3890
Copper & Brass Sales, Inc. Phone: Lorain 7-3380
ELKHART, INDIANA Miratile Mfg. Company Phone: 2-9940
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GRAND RAPIDS, MICHIGAN
Copper & Brass Sales, Inc. Phone: Empire 1-6681
HONOLULU, T. H.
Honolulu Iron Works Phone: 5-0961
Permanente Cement Co. Phone: 5-2541
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KANSAS CITY, MISSOURI Hubbell Metals Inc. Phone: Baltimore 1-7760
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Earle M. Jorgensen Co. Phone: Lorain 7-1122
Reliance Steel & Aluminum Company Phone: Adams 3-3193
U.S. Steel Supply Div.—United States Steel Corp. Phone: Ludlow 5-0101
MEMPHIS, TENNESSEE Hubbell Metals Inc. Phone: Jackson 5-2676
MIAMI, FLORIDA Fullerton Metals Co. Phone: Plaza 7-2531
MILWAUKEE, WISCONSIN
Fullerton Metals of Wis. Phone: Greenfield 6-1100
Korhumel Steel & Aluminum Corp. of Wis. Phone: Evergreen 4-6000
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T. E. Conklin Brass & Copper Co., Inc. Phone: Walker 5-7500
A. R. Purdy Company, Inc., Lyndhurst, N. J.
Lyndhurst: Phone Webster 9-8100 New York: Phone Chelsea 3-4455
Newark: Phone Humboldt 2-5566
OAKLAND, CALIFORNIA
American Brass & Copper Co. Phone: Higate 4-2366
Gilmore Steel & Supply Co. Phone: Glencourt 1-1680
Earle M. Jorgensen Co. Phone: Higate 4-2030
PHILADELPHIA, PENNSYLVANIA
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PITTSBURGH, PENNSYLVANIA
William M. Orr Co., Inc. Phone: Churchill 2-3000
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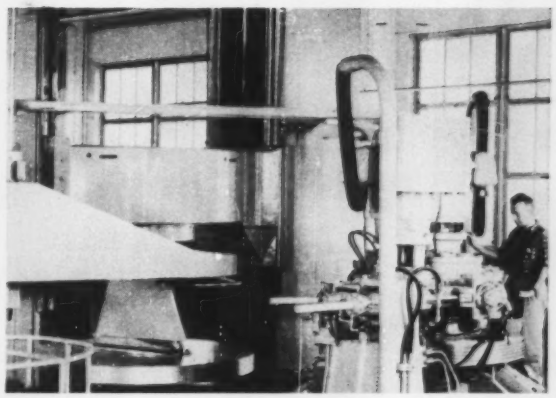
WICHITA, KANSAS General Metals, Inc. Phone: Amherst 7-1208, 7-1209



Large follower wheels trace the wooden master (at left) and wheel travel is related through a hydraulic system to two opposed milling cutters on the machine at right

Machine Contours Airfoils

Using a three-dimensional template, this milling machine reproduces complicated shapes to within ±0.004 in. The two spindles are driven by 75-hp motors

IN ONE setup, this vertical milling machine turns out intricate airfoil contours in a fraction of the time and cost of conventional methods.

Built by Danly Machine Specialties Inc., Chicago, it is at work at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics, Moffett Field, Calif.

Tracer—A wooden pattern is mounted vertically on a revolving table. Two large tracer wheels, in contact with the pattern, follow the contour. The relative motion of the tracer wheels is transmitted to two cutters on the machine.

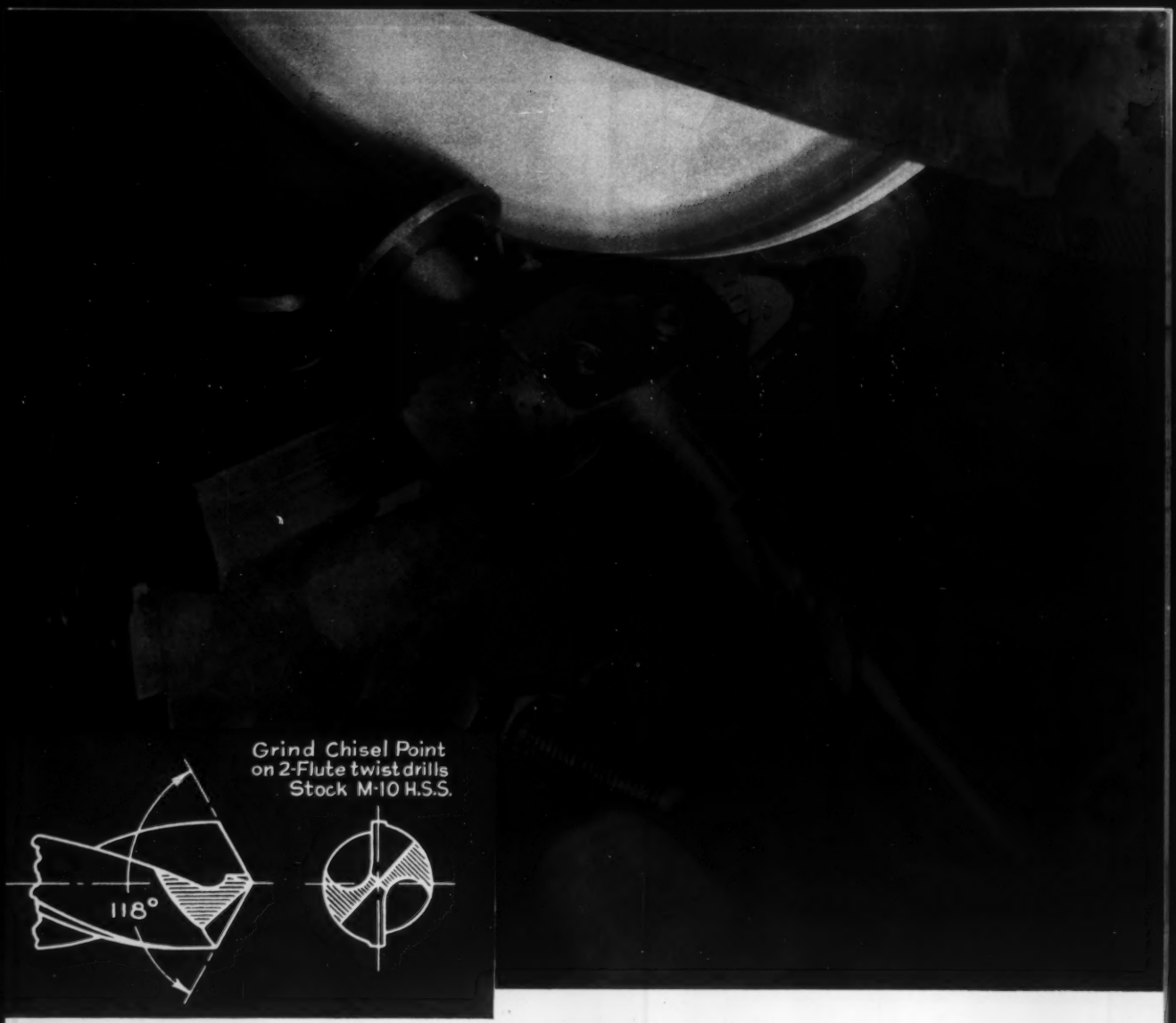
The cutters are positioned against the metal blank which revolves at the same speed as the pattern.

The Machine—Two 75-hp motors drive the cutting tools. Fifteen other motors for such things as table feed and lubrication help make up the total machine horsepower (424).

The machine is fully automatic. It will cut a shape 96 x 18 x 18 in., or 96 x 8 x 26 in. Both the pattern and workpiece mount vertically, precluding sag that otherwise could result from workpiece weight.

Ability—The machine has built-in flexibility to permit it to work on several materials. For cutting alloy steels, a speed range of 78 to 785 sfpm can be used. A range of 314 to 3140 sfpm can be used with aluminum alloys. The machine will work to ±0.004 in. over a 24-in. chordal length.

So far, the machine has been used to carve a series of contoured blades that are installed in the main drive compressors of several large wind tunnels at the Ames Laboratory.

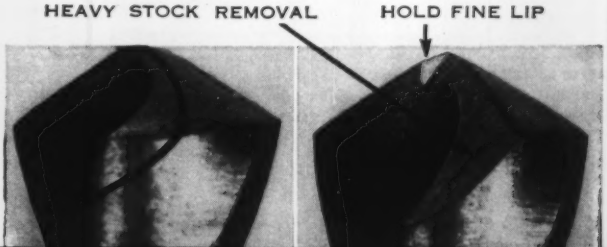


A GRINDING PROGRESS REPORT

Bay State Engineer Finds Way to Triple Production on Chisel Point Grinder

Grinding a "chisel point" on the business end of a twist drill makes it start faster and drill better in hard materials. It's more economical to grind each side of the "chisel" in one cut, as illustrated.

In practice, however, grinding wheels hard enough to hold their corner while cutting the sharp lip, burned the steel in the wide area near the land of the drill. Conversely, wheels soft enough for cool grinding on the land lost their corner rapidly in cutting the lip. In either case, frequent dressing of the wheel was necessary. Because of this, expensive overtime shifts were being worked in an attempt to meet production schedules. Even so, production lagged and rejections were high when Bay State was called in.



Bob Belmont, with 14 years abrasive engineering experience, quickly saw chisel-point grinding as two jobs in one.

Two jobs are done simultaneously with this wheel having two layers of different abrasives. Fine-hard side grinds the drill tip; coarser-softer side makes heavy cut on the land.

Bay State District Manager Bob Belmont saw this drill grinding problem as it really was . . . two distinctly different grinding tasks being done at the same time. To him, here was a natural spot for the "sandwich" wheel, really two wheels in one, with two different layers of abrasives, each having the exact specifications needed for its part of the job. The "specs" worked out for this actual case show the following important differences:

1. The side used for forming the sharp chisel lip has the highly refined 9A (White) Tool Grinding abrasive, a fine grit size (220), and a "hard" bond strength (P grade).

2. The side taking the deep cut on the broad area of the drill land has the less friable 8A abrasive, a relatively coarse grit size (150), and is two full letter grades "softer", (N grade).

With this sandwich wheel, chisel point production rose three times and even more, depending on drill size. In every case, this was more than enough to keep production going smoothly *without* overtime, and with excellent quality of points.

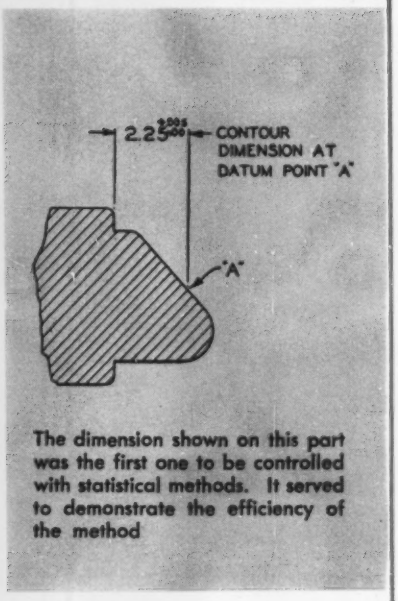
The job had been a production headache because of just one thing . . . it needed the trained abrasive engineering viewpoint to recognize the dual nature of the job . . . and make it work! This type of alert engineering can be skillfully applied to *your* grinding. Simply call in your local Bay State Distributor, or write directly to Bay State Abrasive Products Co., Westboro, Massachusetts.

Branch Offices are located in Bristol, Conn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Pittsburgh, Pa.; with distributors in all principal cities.

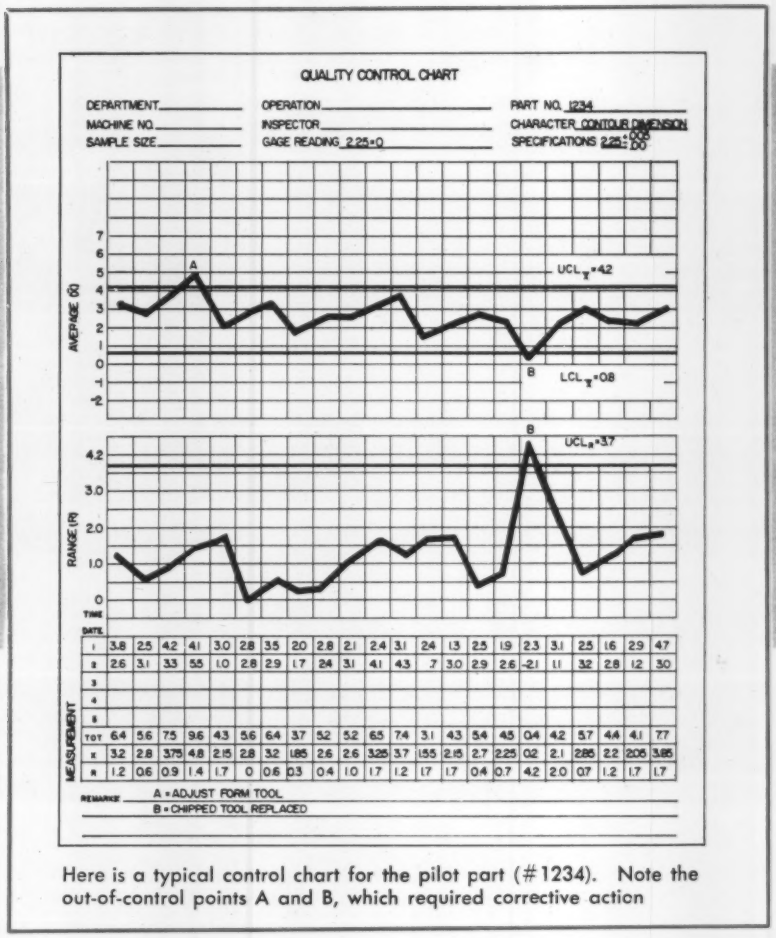
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ont.

BAY STATE®

WHEELS of PROGRESS



The dimension shown on this part was the first one to be controlled with statistical methods. It served to demonstrate the efficiency of the method



Here is a typical control chart for the pilot part (#1234). Note the out-of-control points A and B, which required corrective action

You can cut scrap, reduce repairs and decrease customer complaints by using statistical quality control, say the authors. Here is how such a system works for Mueller Brass Co.

Quality Control For

A CONTROL system based on the principles of statistics effectively improves the quality of automatic screw machine products.

Three years ago, Mueller Brass Co., Port Huron, Mich., decided to install such a system in its automatics department, one of the largest in the U.S. Here are some of the results:

1. Scrap has been reduced from 3.3 per cent to 0.5 per cent.

2. Repairs of production parts have been reduced from 1.6 per cent to 0.5 per cent.

3. Inspection labor has been cut 50 per cent.

4. Customer complaints have dropped 50 per cent.

Installation — Mueller Brass has more than 250 automatic screw machines and secondary equipment. That includes single and multiple spindles, hand chuckers, bar automatics, drill presses, saws, tappers and millers.

The quality control system had to be effective for those machines. It was further complicated by the fact that Mueller Brass is a large job shop, with a minor part of its production assigned to standard items. Its customers number in the thousands. Orders may be as little as 50 pieces. Machines are constantly being re-tooled.

WSCO 74 REV. 6-54

BOX TICKET
BRASS SHOP

PCS. 350 MIX 44 PART NO. 1234

DATE	OPERATOR	MACH.	OPER.	PIECES	SHIFT	INSP.
4/24	502 HD	540	1	350	1	LE
	901 L	411	2	350	1	W
4/24	922 WK	214	3	350	2	R

This is an identification tag. Each operator enters his own information. Inspectors initials are at the right of operator number

By HARMON S. BAYER
Quality Control Consultant
Detroit
&
RAY F. ENGELGAU
Director of Quality Control
Mueller Brass Co.
Port Huron, Mich.

Automatics

Training — An investment in a series of training courses proved to be profitable for all levels of management. Courses in blueprint and gage reading were designed for operators and inspectors. All management personnel from assistant foremen to the works manager studied quality appreciation and a semi-technical course in statistical quality control.

We didn't attempt to make them

QUALITY CONTROL DEPT. — **MATERIAL INSPECTION INSTRUCTION SHEET** — PART NO. Z-5262

PRODUCTION DEPT. BRASS
VENDOR OR CUSTOMER XYZ COMPANY — PART NAME ET - X
ORIG. DRAWING DATE 3-20-1928 — LATEST CHANGE LETTER E
A.Q.L. CRITICAL .25% MAJOR 1.0% MINOR 4.0% INCIDENTAL 6.5%

CODE	CHARACTERISTIC	SPECIFICATION	INSPECTION METHOD	REMARKS
MAJOR				
101	5/8-18 NF Thread Size	Print Spec.	17-5817	X & R chart
102	3/4-16 NF Thread Size	Print Spec.	17-10029	
103	.545 O.D.	Print Spec.	Micrometer	
104	2.119 I.D.	Print Spec.	17-4139	
105	.058 C'Bore I.D.	Print Spec.	17-6489	
106	.503 C'Bore I.D.	Print Spec.	17-5917	
107	.567 C'Bore I.D.	Print Spec.	17-5140	
108	Seat Finish	Print Notes	Visual	Customer Complaint Rec'd.
109	3/4-16 Thread Depth	Print Spec.	Scale	
110	Finish	Nicks Class A		
		Burrs Class A		
		Tool Marks Class A		
111	Missing Oper. & Incomplete Parts	None Allowed	Visual	
MINOR				
201	.765 C'Bore I.D.	Print Spec.	17-8135	
202	3/8 C'Bore Depth	Print Spec.	Scale	
203	.093 C'Bore Depth	Print Spec.	Micrometer	
204	.063 C'Bore Depth	Print Spec.	Micrometer	
205	5/8-18 NF Thread Form	Full Form & Length	Visual & Scale	
206	3/4-16 NF Thread Form	Full Form & Length	Visual & Scale	
207	Center Line Dimensions	Print Spec.	Scale	
208	Overall Dimensions	Print Spec.	Scale	
209	Machine Line Up	Must Be Good	Visual & Scale	
210	Cross Drill Size & Location	Print Spec.	Visual & Scale	
211	.501 Location	Print Spec.	17-6995	
212	Flange Hole Location	Print Spec.	17-6996	
INCID.				
101	All other dimensions	Print Spec.	Gage, Mics or Scale	
102	Contamination	None Allowed	Visual	

COMMENTS: 1/4 ANGLE HOLE 110 210 — 2.119 SIDE 104 202 301 110 209 — .503 SIDE 106 203 301 108 208 110 209 211 — FLANGE HOLES 212 301 210 — BURR (1/2" Holes) 110 — 3/4-16 END 102 201 301 107 206 108 207 109 209

5/8-18 BRANCH 102 204 301 103 205 106 207 108 209 110

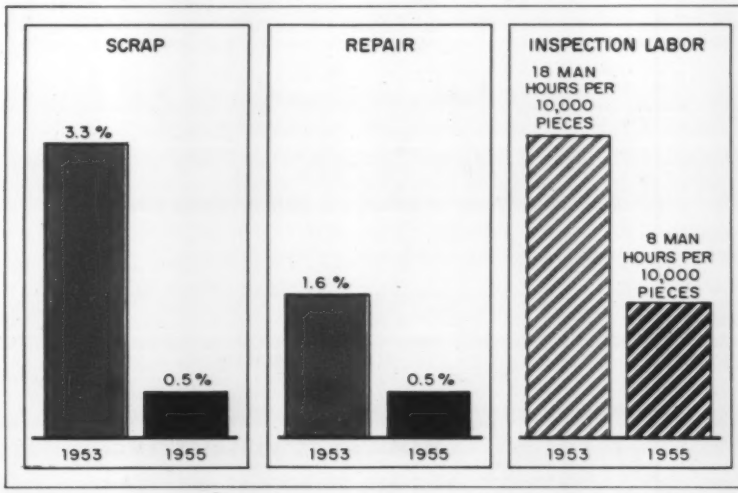
BURR (FLANGE HOLES) 110

MRW.

PREPARED BY Q. R. DATE 2-18-1955

WSCO 1ST REV. 6-55

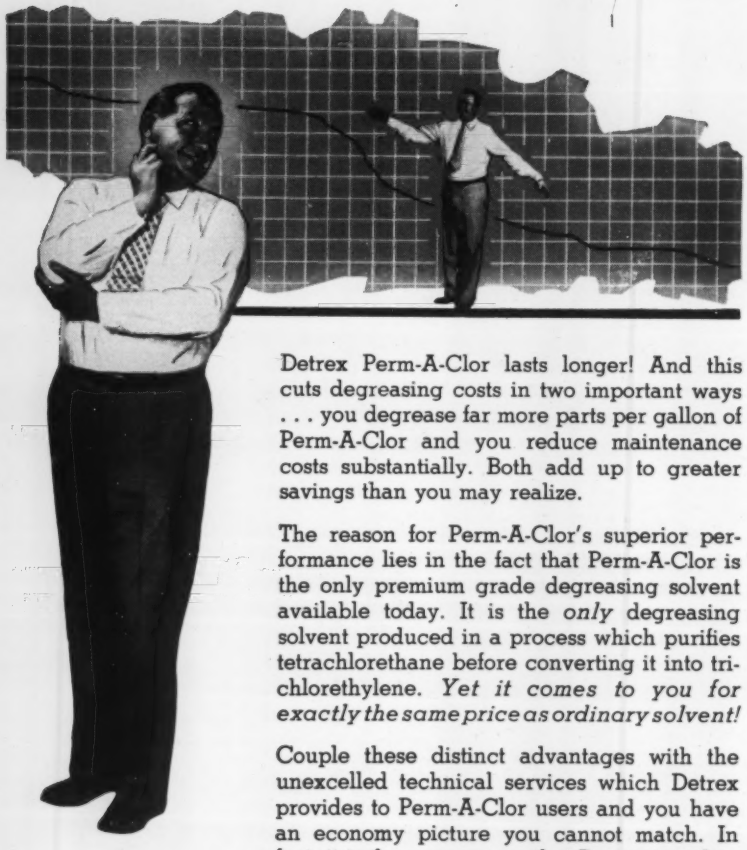
Inspection instruction sheets are indispensable. This one is used with the process acceptance sampling, receiving and auditing plans



These bar graphs dramatically show the effects of the statistical quality control program at Mueller Brass. Results in 1956 are even better

DETREX Perm-A-Clor

REDUCES YOUR PRODUCTION COSTS



Detrex Perm-A-Clor lasts longer! And this cuts degreasing costs in two important ways . . . you degrease far more parts per gallon of Perm-A-Clor and you reduce maintenance costs substantially. Both add up to greater savings than you may realize.

The reason for Perm-A-Clor's superior performance lies in the fact that Perm-A-Clor is the only premium grade degreasing solvent available today. It is the *only* degreasing solvent produced in a process which purifies tetrachlorethane before converting it into trichlorethylene. *Yet it comes to you for exactly the same price as ordinary solvent!*

Couple these distinct advantages with the unexcelled technical services which Detrex provides to Perm-A-Clor users and you have an economy picture you cannot match. In fact, it is the very reason that Detrex is industry's largest direct supplier of trichlorethylene.

To get specific facts and figures on the savings in your plant—a Detrex representative will give them to you in black and white—just fill out the coupon below. No obligation if we can't prove our point.

☐ Send me complete information on Detrex Perm-A-Clor

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COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Dept. A-1101

DETREX CHEMICAL INDUSTRIES, INC.

BOX 501, DETROIT 32, MICHIGAN

DEGREASERS • DEGREASING SOLVENTS • WASHERS • ALKALI AND EMULSION CLEANERS • PHOSPHATE COATING PROCESSES

QUALITY CONTROL . . .

experts: It's enough that they appreciate how the system works and how it affects their operation. In addition, quality control engineers and technicians took a highly technical course in quality control.

Organization—The first step is to establish an engineer-technician team. The engineer is responsible for the entire quality control system. Technicians assist him in one specific section.

The engineer is a college graduate whose education has been augmented with courses in statistics and statistical quality control. Technicians selected were former inspection supervisors. The combination is quite successful.

Gages — Mueller Brass invested in indicating gages to replace go, not-go gages, which were obsoleted. It was expensive, but the savings are paying off. One indicating gage will replace many go, not-go types. The indicating ones don't wear out as often and they are faster. Replacement costs are at a minimum.

Identification — To tie down mistakes, you must identify the stock. A ticket system is used to record all personnel who work on an item. With that method, the workman responsible for the defect can be traced. It turned out to be the heart of the follow up system because supervisors can use them as facts to gain correction.

Pilot Jobs — At the start of the program, we picked a pilot job on a series of six spindle machines. It was hard to get a form tool to maintain an arc dimension.

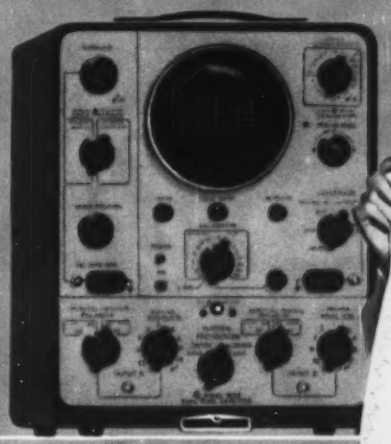
A quality capability study showed that the machine could do it. That astonished production personnel who were convinced that the machines weren't capable of the close tolerances desired.

An $\overline{X}$ & R chart was established at each machine. An inspector measured a sample of parts and plotted the readings. Job setters took action when the chart indicated an out-of-control situation.

Through the analysis, we found a tooling fault and differences in adjustments between spindles. Within a short time they were corrected. Scrap and repair dropped from approximately 5 per cent to less than 0.1 per cent. The 100 per

(*Please turn to page* 183)

A woman's place is in the home?



HEWLETT-PACKARD'S NEW, MODEL 150 OSCILLOSCOPE

Not any more... and Hewlett-Packard Instruments project them into highly technical occupations!

But no matter who operates them, it is logical that Hewlett-Packard's ability to design their complex, electronic instruments would be reflected in their demand for efficient and economical assembly methods.

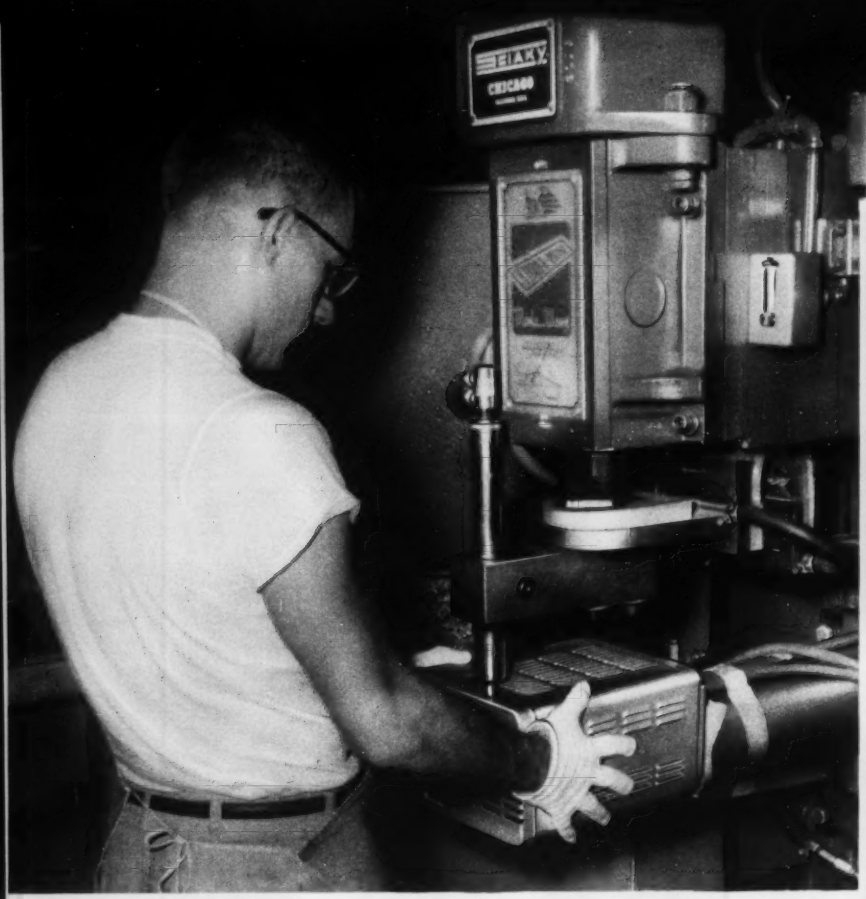
That's why, almost without exception, Hewlett-Packard depends on Sciaky resistance welding techniques and equipment to satisfy their rigid specifications for fastening—aluminum cases of all sizes and shapes . . . complex chassis assemblies . . . even precision variable condenser stators and rotor assemblies.

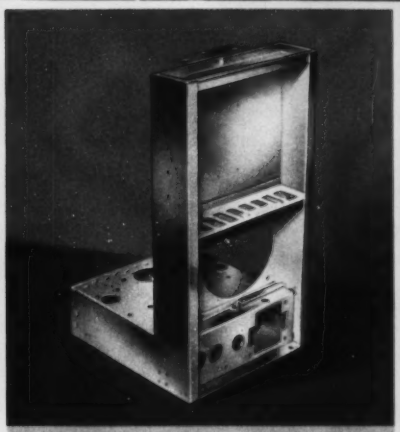
Putting the profits back into manufacturing is the Sciaky concept of design. So, whether or not *you* make instruments—assemble the metal pieceparts of *your* product to best advantage with Sciaky resistance welding techniques—like Hewlett-Packard does!

SCIAKY®

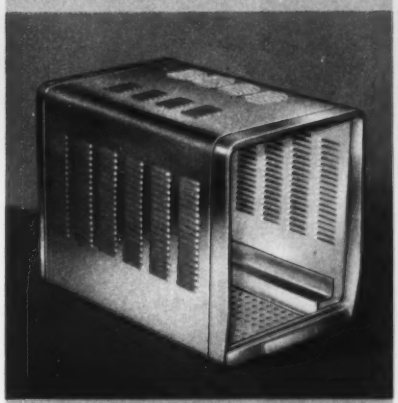
Largest Manufacturers of Resistance Welding Machines in the World

Maybe the details of Hewlett-Packard's operation on the next page will help you improve your own

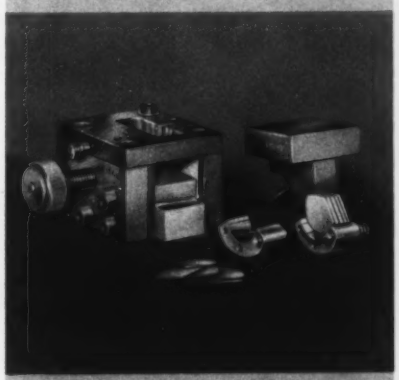




OSCILLOSCOPE CHASSIS—resistance welding 12 piece parts of 14 and 12 ga. 52S aluminum; 80 spot welds per chassis; 40 chassis per day with two welders.



SIGNAL GENERATOR CABINET—resistance welding 8 piece parts, 14 ga. 52S aluminum and cast bezel; 55 welds per cabinet; 16 cabinets per hour with two welders.



VARIABLE CONDENSER—projection welding 6 piece parts to high accuracy in one stroke; 350 condensers per day with two jigs, one operating, one loading.

Sciaky Resistance Welding Techniques increase production 150%

Better product quality, easier assembly are additional benefits

For Hewlett-Packard Company, Palo Alto, California, leading electronic instrument manufacturer, Sciaky Resistance Welding Techniques have provided four basic cost cutting production advantages—

1. **Increased production—as much as 150%.**
2. **Elimination of fit-up problems of riveting.**
3. **Simplified quality control procedures.**
4. **Adaptability of equipment to pilot runs without costly tooling.**

So successful have Sciaky Resistance Welding Techniques been —even on jobs where other equipment failed—that Hewlett-Packard is now designing all new products for Sciaky Resistance Welding. And old products are being redesigned to take advantage of this economy, too.

Described at the right are a few of the jobs being done at Hewlett-Packard with Sciaky Resistance Welding Techniques *designed to put the profits back into manufacturing.* These and other jobs are described in greater detail in "Resistance Welding at Work," Vol. 5, No. 2. Write for your free copy today.

Largest Manufacturers of Resistance Welding Machines in the World

SCIAKY

Sciaky Bros., Inc., 4928 W. 67th Street, Chicago 38, Illinois POrtsmouth 7-5600

cent inspection on the part was removed.

Charts—The next phase was to spread quality control charts ($\bar{X}$ & R) to all parts. It served two purposes: First, we were able to study the problems of the department. Next, it helped to train the engineer and his technicians.

Placing the charts had many results. Some of the most difficult dimensional problems were exposed and corrected. Scheduling and maintenance departments used the charts to analyze the capability of the machines. That resulted in either rescheduling on a more effective piece of equipment, or repair by the maintenance department. The charts also exposed tooling problems which helped tooling engineers in developing more effective tools. Job setters learned more effective ways of setting up tools and work pieces.

We found some cases in which a piece of equipment in an excellent state of repair could not produce to the specification. Engineers were asked to analyze the specification and determine whether it was realistic, economic, and competitive. In many cases, we got wider specifications which didn't affect the function of the part. In some instances, methods engineers made changes in sequence of operations which improved the quality.

Acceptance Sampling — Placing $\bar{X}$ & R charts is not a complete answer. They usually reflected only one problem like O.D., I.D. or length. Any part has several characteristics which are important to the customer.

We started an acceptance sampling plan which is more effective than any 100 per cent inspection. It's based on the principle that each operator is responsible for his own quality.

An instruction sheet for each part lists each inspection operation. Characteristics are separated into critical, major, minor, and incidental groups, and a quality level (A.Q.L.) is assigned to each group. The instructions insure consistent inspection for each part regardless of shift or person.

Standard sampling plans (which are designed to give the quality

(Please turn to page 186)

Stainless Steel Finisher finds...

3M Abrasive Belts best for critical surface polishing

3M ABRASIVE BELT on a wide sheet polisher puts perfect surface finish on stainless steel sheets.

3M ABRASIVES

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Ave., New York City.

PRODUCT OF 3M COMPANY RESEARCH

Thomson Stainless Steel Polishing Co., Berwyn, Illinois finishes and polishes stainless steel sheets to customer specifications. This company finds that with 3M Abrasive Belts they are able to provide any of five standard finishes to meet customer requirements. 3M Abrasive Belts enable them to fulfill these varying daily job requirements easier and faster than with ordinary belts.

Put 3M Coated Abrasive Belts to work on your flat polishing operations. They'll meet your finishing requirements and help you cut costs and increase production, too.

WANT MORE INFORMATION?

Minnesota Mining and Manufacturing Co.
Dept. GJ-27, St. Paul 6, Minnesota

☐ Please have a 3M Representative call. I want to know more about 3M Coated Abrasive flat polishing methods.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Is steam treating an "unknown-quantity" to you?

If you work with metal . . . ferrous or non-ferrous . . . and haven't considered steam atmosphere heat treating for your product, you may find you've overlooked an unsuspected source of surprisingly substantial savings.

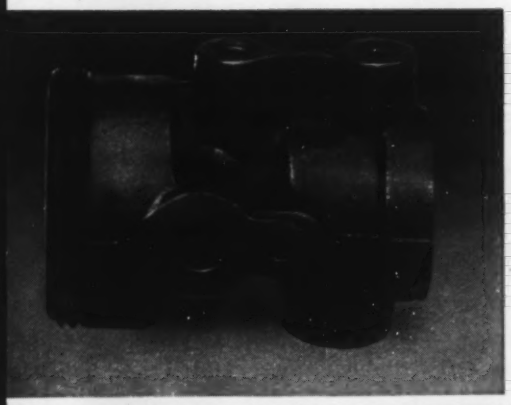
For in scores of plants it's becoming an outstanding cost-cutter on parts made of high speed steel, powdered iron, carbon steel, grey iron, brass aluminum and beryllium copper. And its advantages are almost as numerous as the materials being steam treated.

On high speed cutting tools, for instance, it keeps tools sharp longer. On powdered iron, compressive strength and hardness increase appreciably. On carbon steel it gives a uniform, attractive, blue-black finish. On grey iron it seals against porosity and gives a high degree of corrosion resistance. On non-ferrous parts it produces scale-free work ready for bright dip or often for use "as-is."

Here and on the opposite page are just four examples to illustrate our point. If you want others . . . or details on any of these . . . or want us to help investigate possible savings you can make, just phone your nearest L&N office or write us at 4957 Stenton Ave., Phila. 44, Pa. Catalog TD2-620(1) tells all about it, too; we'll be glad to send you a copy.

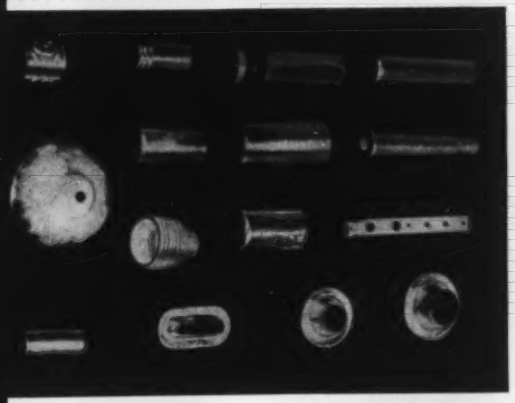
LEEDS NORTHRUP
instruments automatic controls • furnaces

If you would like to investigate the effect of steam treating, we will be glad to steam treat sample parts from your own plant for you.



Replaces Cadmium Plating . . . These grey cast iron valve bodies are used in the pneumatically operated sanders that deliver sand for improved traction under the wheels of trains, trolleys and trucks. Their manufacturer had a double-barreled problem . . . porosity in the castings was causing excessive rejects . . . expensive cadmium plating was necessary to prevent corrosion in service.

Steam treating has solved both problems in one operation. Rejects due to porosity have been eliminated, and many valves previously rejected have been salvaged. Cadmium plating has been eliminated entirely because exhaustive salt spray tests showed the steam-treated finish had a higher resistance to corrosion.

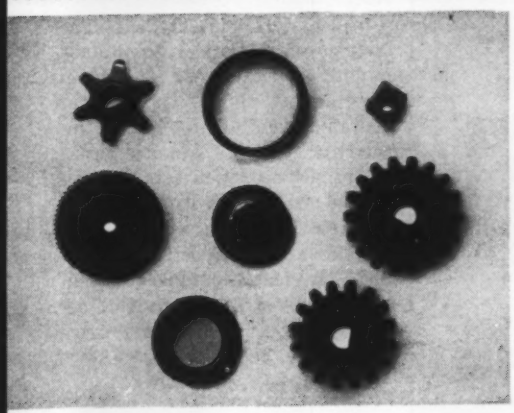


Cuts Expensive Pickling Costs . . . Non-ferrous lipstick tubes and other cosmetic containers made by a large Canadian manufacturer must be annealed before finishing operations can be performed. Scale was a problem. If left on, it ruined tools and dies . . . removing it meant expensive, messy pickling.

The solution was found when sample parts were annealed by the steam Homo® method. When this method was adopted as an integral part of the production line, pickling was eliminated. Subsequent figures from the cost-accounting department showed that eliminating this operation reduced annealing cost by 53 percent.

Puts "Extra-Life" in Cutting Tools . . . A machinery manufacturer faced a tough problem when specifications called for milling a 0.250 inch wide key-way slot into a piece of 4140 cold-rolled bar stock which was heat treated to a hardness of Rc 34 to 38. In addition, tolerances were tight . . . ±0.001 inch . . . with sides perfectly square.

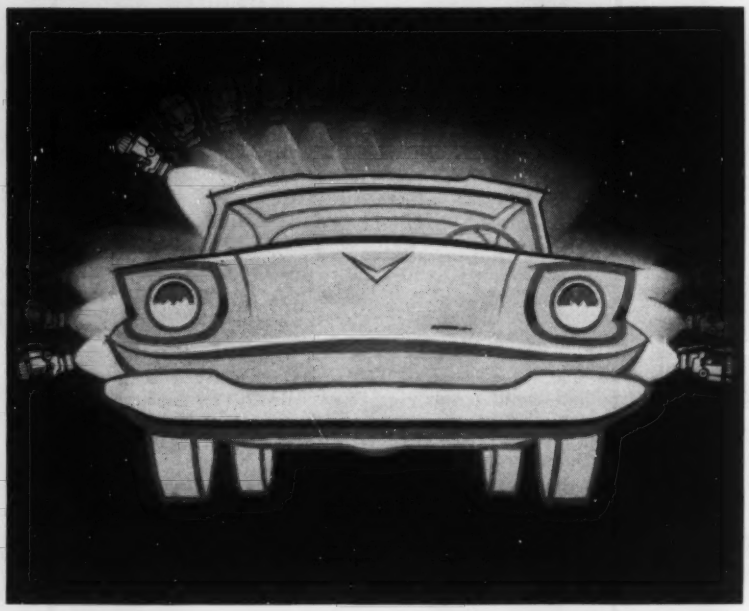
The first high-speed steel tools used produced only four cuts and could not be resharpened because of the close tolerance. Hard-chroming the same tools improved cutter life to about 11 pieces per tool. Carbide tools held up for from 11 to 14 pieces. The next move was steam treating experimental batches of tools in an L&N furnace. The first batch averaged 100 parts per cutter, a second batch, 60 to 70 and a third lot, 100 to 125.



Raises "psi" of Powdered Iron Parts . . . Although many parts made of powdered iron function satisfactorily in the as-sintered condition, there are others where an increase in hardness and compressive strength is an advantage.

This is particularly true of such parts as the steam-treated gears, cams, etc., shown at left, where additional strength is needed on critical bearing surfaces. The shock-absorber piston in the center, for instance, presented a real problem . . . how to meet psi specifications for the thin-section flange around the outer edge. Steam treating proved a cheap, practical solution. Tests showed compressive strength of the flange increased from 1200 to 1400 psi. In addition, the parts, when oil dipped, had a pleasing uniform, blue-black color and high corrosion resistance.

Mechanized painting eliminates human errors

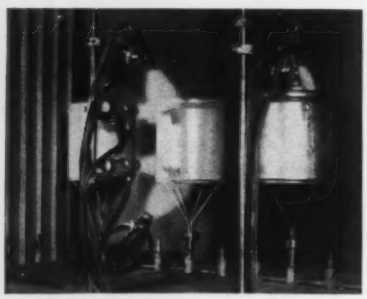


DeVilbiss Automatic Contour Spray Machines are a vital part of the finishing lines in the world's most modern plants, turning out gleaming finishes in a variety of colors at low cost.

DeVilbiss automatic spray machines consistently turn out paint jobs to perfection . . . on products of practically any size and shape. Split-second timing and accurate gun positioning cuts paint waste to a minimum, and ensures absolute uniformity of finish on every part. And these results are attained with high-volume production at remarkably low cost!

But it takes more than just ordinary spray equipment to do the flawless, cost-saving jobs that are demanded today. DeVilbiss meets this demand with experience and know-how that combine the full knowledge of materials, production methods, and spray techniques with the most versatile, efficient automatic spray equipment that's available.

Why not let us test run your product in our Customer Lab – without obligation – for a report of actual costs, plus projected savings over your present system? Our nearby representative will gladly make the arrangements.



Simultaneous painting of exterior and interior of these 5-gal. pails is typical of versatility, efficiency of DeVilbiss automatics.

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Santa Clara, Calif. • Barrie, Ontario
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FOR BETTER SERVICE, BUY
DEVILBISS

DEVILBISS HELPS YOU GET THE MOST FROM THE SPRAY METHOD

QUALITY CONTROL . . .

protection desired) enable anyone to find out how many samples will be checked at each operation.

The final part of the system requires that a part may not move to the next operation unless it has been checked. When approved, a lot is allowed to move to the next operation. If it's rejected, a lot is returned to the production supervisor. He is responsible for taking action and can have it sorted, repaired, or scrapped. In certain cases, he may return it to the operator at fault for repair or sorting. The foreman may request quality control to sort the lot and charge the costs to the production department. If that happens too often, the inspection department may refuse to sort the part.

Critical or Resubmitted Lots

A.Q.L.	0.25
Sample size	50
Acceptance number	0
Rejection number	1

Major Groups

A.Q.L.	1.0
Sample size	15
Acceptance number	0
Rejection number	1

Minor Groups

A.Q.L.	4.5
Sample size	5
Acceptance number	0
Rejection number	1

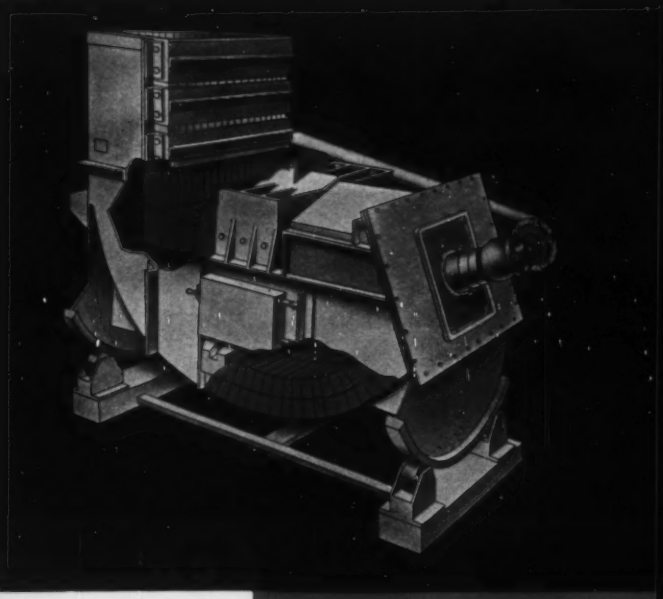
Incidental Groups

A.Q.L.	6.5
Sample size	3
Acceptance number	0
Rejection number	1

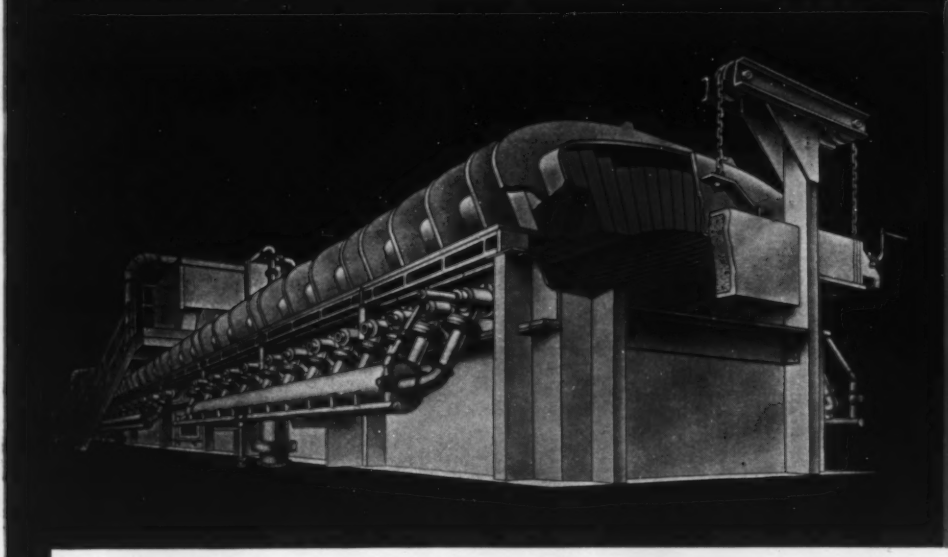
Audit — This system is used before the material is shipped. The principles of statistical acceptance sampling are again used. A random sample is taken, and if it is not acceptable, the entire lot is returned for sorting. Mueller Brass has dropped 100 per cent inspection and minimized its inspection costs. As the process systems take hold, the audit inspection is curtailed. In most instances it can be removed entirely with full assurance that customer and management are being protected.

(Please turn to page 189)

Why B&W Allmul Firebrick withstand punishing service in furnaces like these



▲ Direct-fired reverberatory furnace for melting brass, aluminum, and iron. For longer refractory life, B&W Allmul Firebrick are used to line the bath and arch.



◀ In this type of furnace for continuous high speed heating of strip for welding into pipe, temperatures in excess of 3000 F are common and the atmosphere is contaminated with iron oxide. Because of their resistance to spalling and metal penetration, B&W Allmul Firebrick have set new standards for refractory life in bungs, burner blocks and recuperators.

B&W Allmul Firebrick stand up under extremely high temperatures at continued high rates of operation because they are produced from electrically melted mullite grain by a highly efficient process. These top-quality brick have high hot-load strength, high resistance to spalling, good volume stability and a melting point of 3335 F.

They are practical from a cost standpoint for a wide range of applications in the ferrous and non-ferrous metal industries. Illustrated on this page are a butt-weld furnace as well as a direct-fired reverberatory furnace. Other services are direct and indirect-arc electric furnaces, air furnaces, furnace hearths subject to iron oxide scale attack, crucible melting units and furnaces melting many non-ferrous metals and alloys.

Your B&W representative can show you how B&W Allmul can lower your refractory costs in many heavy-duty services. Consult him or write for Bulletin R-34A, giving data on B&W Firebrick for exacting services.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

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WORKS: AUGUSTA, GA.

14 Industrial Cranes
chosen by largest railroad car shop

wall traveling jib crane features maximum hook coverage

This mammoth railroad car shop installed 14 *Industrial* wall traveling jib cranes to obtain maximum flexibility of operation without obstruction of floor space or interference of overhead cranes. Operating singly or in multiples these *Industrial* cranes easily move along the long runway with assembly line load and in effect give infinite number of jib crane installations depending on requirements.

Consult with Industrial Crane & Hoist for practical answers to your materials handling problems.

3-ton capacity with 30 ft. span Wall Traveling Jib Cranes with Hi-carbon steel boom. Cranes operate on six double flange 12" forged steel wheels rolling on two horizontal and one vertical runway.

Industrial CRANES

INGERSOLL B-W BORG-WARNER

INDUSTRIAL CRANE & HOIST

INGERSOLL PRODUCTS DIV. BORG-WARNER CORP.

1550 S. PAULINA STREET, CHICAGO 8, ILLINOIS

Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

QUALITY CONTROL . . .

Receiving — We also put in a statistical system at receiving and organized it as an audit inspection. An instruction sheet is prepared on each item purchased.

Standard acceptance sampling plans are used. A sample is taken on each lot received. If the quality of the lot is acceptable, it is sent to production with no further check. If the sample indicates undesirable quality, it is returned, sorted or repaired at the vendor's expense.

Special Studies — The engineer-technician team is an effective service. It conducts special studies on capabilities of machines, methods, and personnel. Departments use the information to plan their own activities in engineering and scheduling. The team applies advanced statistical engineering, like correlation and analysis of variance to analyze the causes of quality difficulties. The studies not only help the particular situation, but help to sell the program.

Complaint Investigation — When Mueller Brass receives a complaint, the quality control engineer, working with the inspection and production supervision, investigates the cause of the problem. The persons responsible fill out a report indicating what they will do to prevent a recurrence. In each case, the information is distributed to all concerned.

Conclusion — Statistical quality control charts by themselves have never corrected any job. They merely expose troubles, highlight the problem, and provide meaningful data which engineers, maintenance men and supervisors can use.

Co-operation is the real key to a successful statistical system. The day-to-day strategy of pushing changes when necessary or holding back a little to allow emotional adjustment is a fine art that will pay off when it's used properly.

The system at Mueller Brass is no magic formula, but with hard work and mature direction, it continues to pay for itself—it already has paid for itself many times over.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

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Fifth wheel steer. Pneumatic tires. Steel deck. Oak end and side racks.

CUSTOM-BUILT and quality-built for long-time, low-cost service. Flat steel wheels, solid rubber or pneumatic tires. Fifth-wheel or four-wheel knuckle steer. Steel or wood deck, or special superstructure. Any desired capacity.

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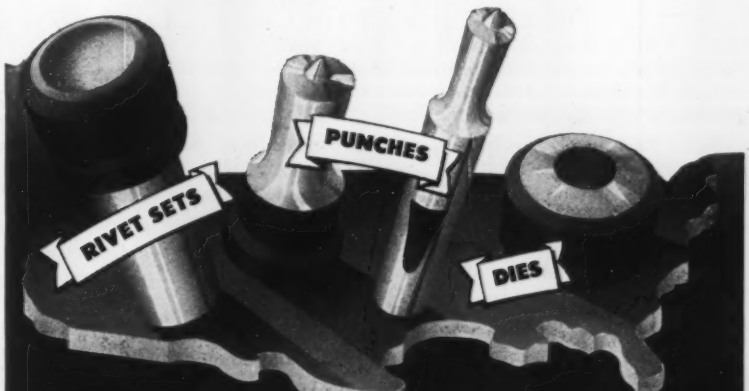
NATIONAL SUPPLIER FOR 54 YEARS

Punches, Dies, Rivet Sets, "Heatproof" Compression Dies.

Round, square, oblong Punches and Dies—Rivet Sets carried in stock.

Write Dept. A for catalog 54 and new stock list.



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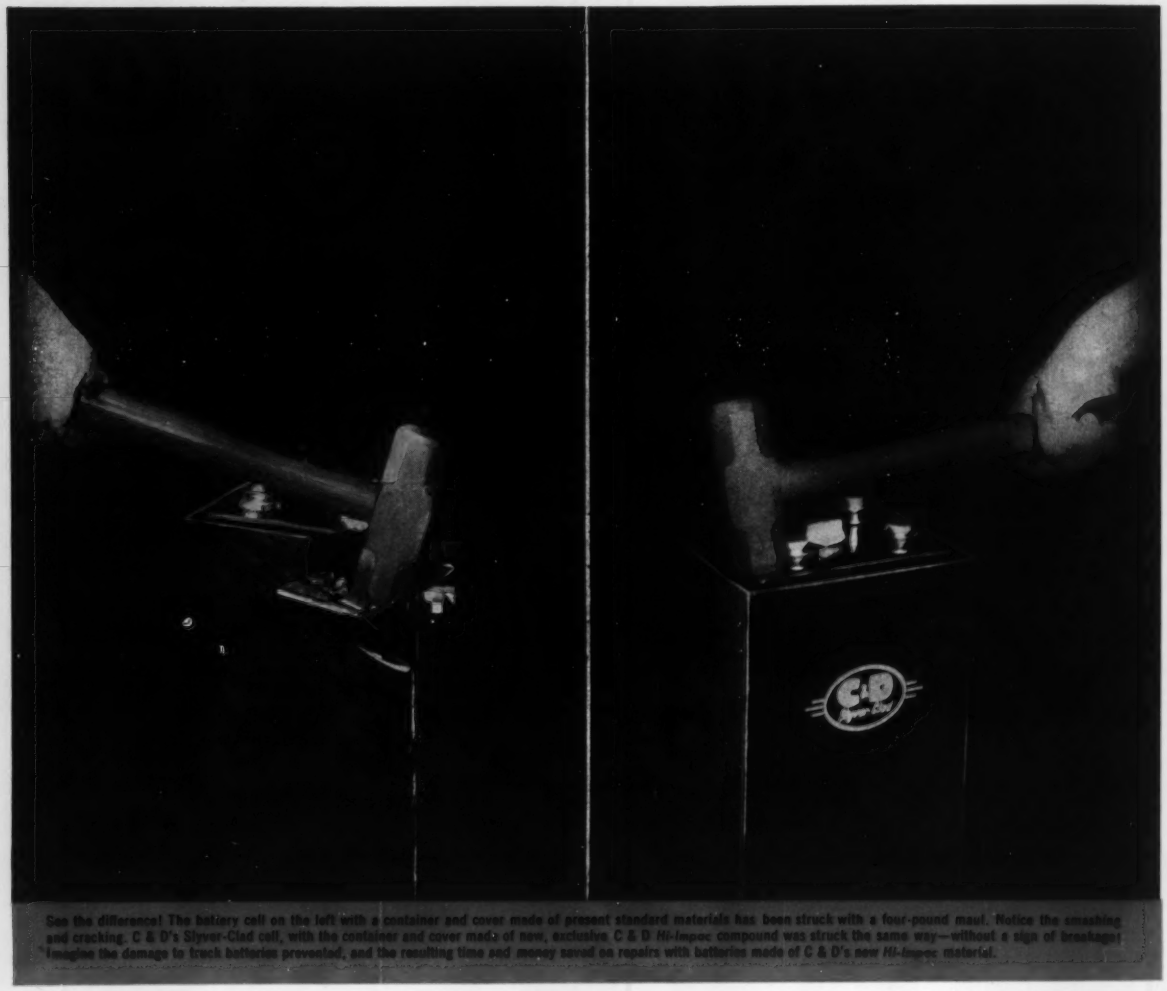


See the difference! The battery cell on the left with a container and cover made of present standard materials has been struck with a four-pound maul. Notice the smashing and cracking. C & D's Slyver-Clad cell, with the container and cover made of new, exclusive C & D *Hi-Impac* compound was struck the same way—without a sign of breakage! Imagine the damage to truck batteries prevented, and the resulting time and money saved on repairs with batteries made of C & D's new *Hi-Impac* material.

NOW...BATTERY BREAKAGE IN ELECTRIC INDUSTRIAL TRUCKS VIRTUALLY ELIMINATED

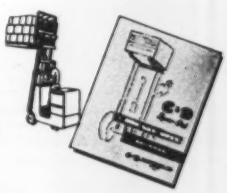
...with new C&D *Hi-Impac* cell cover and container!

New C & D *Hi-Impac* material for cell covers and containers for industrial storage batteries was developed jointly by C & D's research department and those of the major rubber companies. Thoroughly field tested, the *Hi-Impac* material virtually eliminates the danger of cell container and cover damage by dropping, collision between trucks, or from the impact of heavy objects falling on the battery. Thus, C & D *Slyver-Clad*® batteries with the *Hi-Impac* containers and covers practically never have to be shopped for cell replacement or repair due to cracked or broken containers and covers.

All sizes of C & D's famous, Five-Fold *Slyver-Clad* batteries are now made with exclusive *Hi-Impac* material. Now with C & D batteries you not only get extra-capacity in a standard size tray; you also get *Hi-Impac* cell covers and containers that virtually eliminate breakage. It's one more reason why—

C&D is your best battery buy!

For details and specifications on C & D *Slyver-Clad* batteries with *Hi-Impac* cell covers and containers for electric industrial trucks and motorized lift trucks, write for Bulletins IT-524/56 and IT-525/56.



C&D BATTERIES, INC.

of Conshohocken, Pa.

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SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

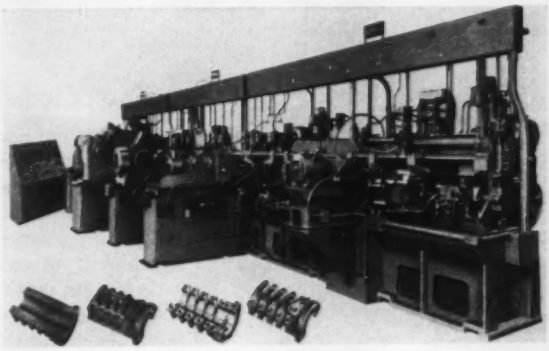
Automated Machine Makes 450 Bearing Caps an Hour

The Bearing-cap-amatic is a 20-station unit which produces a complete matched set of five finished bearing caps from a single casting.

The machine is sectionalized to make it easier to install and adapt to model changes.

A built-in coolant system is manifolded to each tool to minimize tool wear and to help carry away chips. An automatic chip conveyor also serves as part of the coolant return system.

All milling spindles are adjustable, and tool setup points have been built into the fixtures. *Write*: LaSalle Tool Inc., 3840 E. Outer Dr., Detroit 34, Mich. *Phone*: Twinbrook 2-1525



Car Unloads 20,000-Lb Coils from Reels

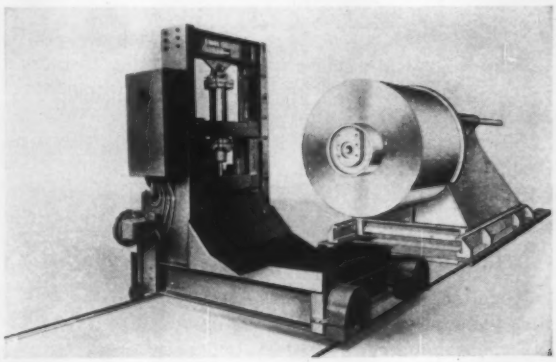
Three standard models handle 7500 to 20,000 lb coils. They load them onto pay-off reels and unload coiling reels.

Coils are carried in a cradle supported in a L-shaped frame which is raised and lowered hydraulically.

The car operates on two rails set at floor level, eliminating the need for pits.

It is loaded from a coil ramp, lift truck or crane, then moved across the tracks into position near the reel, so it is ready to reload the reel.

Power is supplied from an outlet near the end of one of the rails and is carried to the car's controls by a cable. *Write*: Herr Equipment Corp., 1200 Vine St. NE., Warren, O. *Phone*: 5958-1



Bulk Materials Moved by Oscillating Conveyor

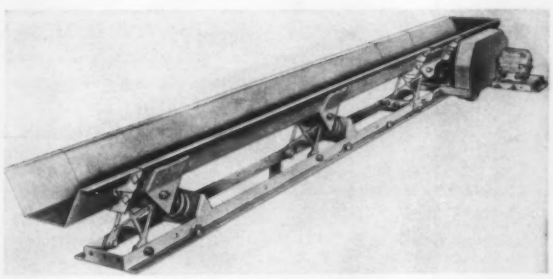
The Coilmount conveyor imparts motion to the material carried in its trough by a constant-stroke eccentric drive which produces an upward and forward oscillating movement. Result: A gentle, continuous forwarding of materials, regardless of overloads or surges.

The trough support system functions as near to natural frequency as practicable. This keeps power requirements low and stress on parts under load to a minimum.

The positive action drive maintains a constant amplitude of vibration and a constant conveying action.

Conveyors come in 5 to 10 ft lengths. Assemblies can be up to 100 ft. Trough widths are 10 and 20 in.; thicknesses are 10 gage and 3/16-in.

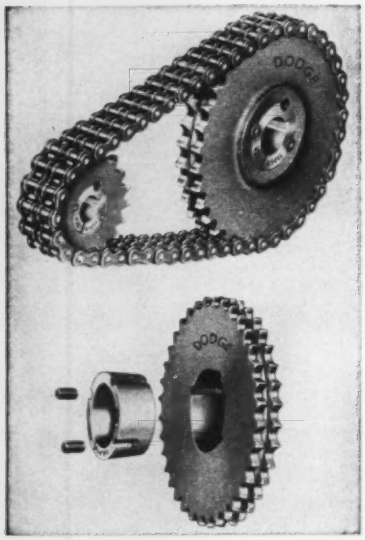
Divider plates can be installed in the trough to convey more than one material at a time. Materials can be discharged at any point. *Write:* Department PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill. *Phone:* Randolph 6-7790



NEW PRODUCTS and equipment

Double Strand Sprockets

These roller chain sprockets require no reboring or other machining for installation.



They come in pitch sizes from ½ to 1 in. Hardened steel teeth are standard in sprockets up to the 21 tooth size. *Write*: Dodge Mfg. Corp., Mishawaka, Ind. *Phone*: 9-2421

Abrasive Cutter

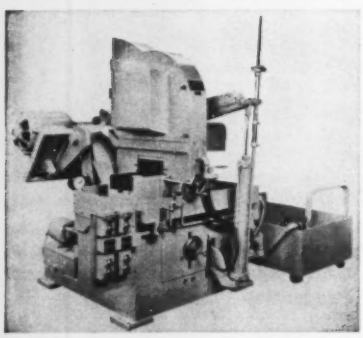
Model 481 is a wet abrasive cutting machine powered by a 25-hp fan cooled motor.

The oscillating unit cuts ferrous and nonferrous metals—bar stock, tubing and other shapes. It will handle up to 8-in. square solids.

Work feed and work clamps are operated hydraulically; the work bar is fed by hand.

The oscillating motion reduces the amount of abrasive wheel contact. Cutting is done with a minimum of wheel pressure.

A belt tension unit applies and holds any desired degree of tension regardless of the amount of load imposed by the cutting wheel. *Write*: Campbell Machine Division, American Chain & Cable Co. Inc., 929 Connecticut Ave., Bridgeport 2, Conn. *Phone*: Edison 5-0161

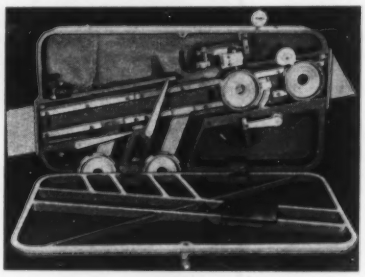


Gear Classifier

Root diameters of external splines or keyways on drum-type parts are checked automatically with this monitoring system.

Gaging action is based on "point contact" of individual probes. The two-point system—lower stationary probe and upper floating probe—measures all the production from a single machine or a bank of them.

Operation: Parts enter the classifier from the right side and move down the inclined ramp to a stop position. They are indexed and measured in the probe-sizing operation. Parts with root diameters within specified tolerances continue through the classifier to the next operation.



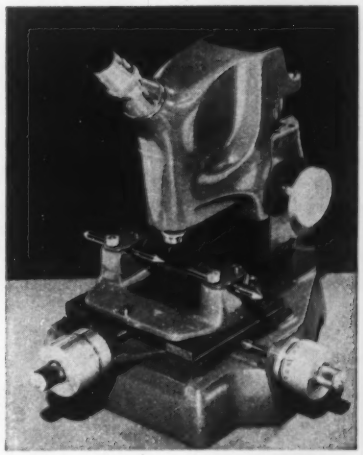
Oversize or undersize parts are shunted aside automatically and collected separately for salvage or scrap. *Write*: Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Toolmaker's Microscope

Jigs, templates, tools and finished parts can be inspected and measured with this microscope.

Its built-in illuminating system directs a beam of light down through the microscope objective to give true vertical illumination.

A collective mirror under the stage plate reflects the light back into the body tube so the surface and contour of parts can be viewed simultaneously.



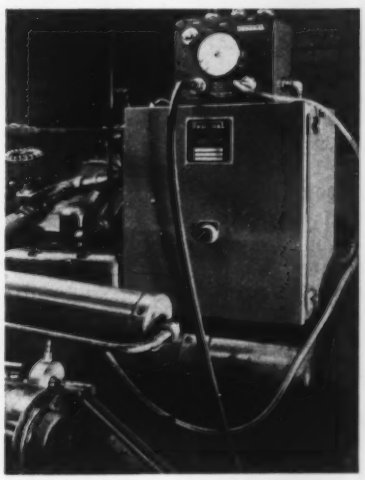
Standard magnification is 35 power, but different objective and eyepiece combinations may be used to obtain other magnifications. *Write*: Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y. *Phone*: Locust 2-3000

Grinding Gage

The 493-CG is a measuring gage for centerless grinding machines. It continuously measures output and visually indicates any trend toward out-of-tolerance work. Audible signals can be used.

The gage incorporates an adjustable time delay response so that it will respond to workpiece size only, ignoring local irregularities such as spaces between workpieces, oil holes and grooves.

Indicating limits can be set within the spread of the tolerance so that the operator will be signaled



United Air Lines will pick up and deliver your shipment . . . hold space for it, too!

Want your shipment on a particular United Air Lines flight? Just say the words—"Reserved Air Freight." This guarantees the space you need on *any* flight you want. United will provide pickup and delivery service if you wish. For further assurance, United's system-wide Customer Service will monitor your shipment all the way to its destination.

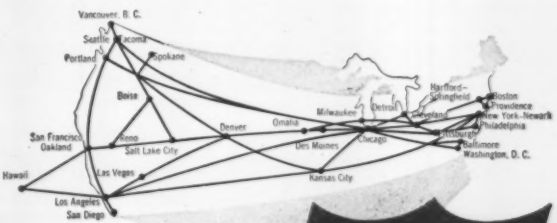
There's assurance, too, in United's frequent, high-speed Air Freight schedules, including same-day DC-7 Mainliners and 30,000-lb.-capacity DC-6A Cargoliners coast to coast. All this is part of the new standard in Air Freight set by United. Specify UAL† on your next airbill, then notice the difference.

†UAL is a service mark used and owned by United Air Lines.

Examples of United's low Air Freight rates

	per 100 pounds*
CHICAGO to CLEVELAND	$4.78
DENVER to OMAHA	$6.42
NEW YORK to CHICAGO	$7.50
SEATTLE to LOS ANGELES	$12.02
PHILADELPHIA to PORTLAND	$24.15
SAN FRANCISCO to BOSTON	$27.00

*These are the rates for most commodities. They are often lower for larger shipments. Rates shown are for information only, are subject to change, and do not include the 3% federal tax on domestic shipments.



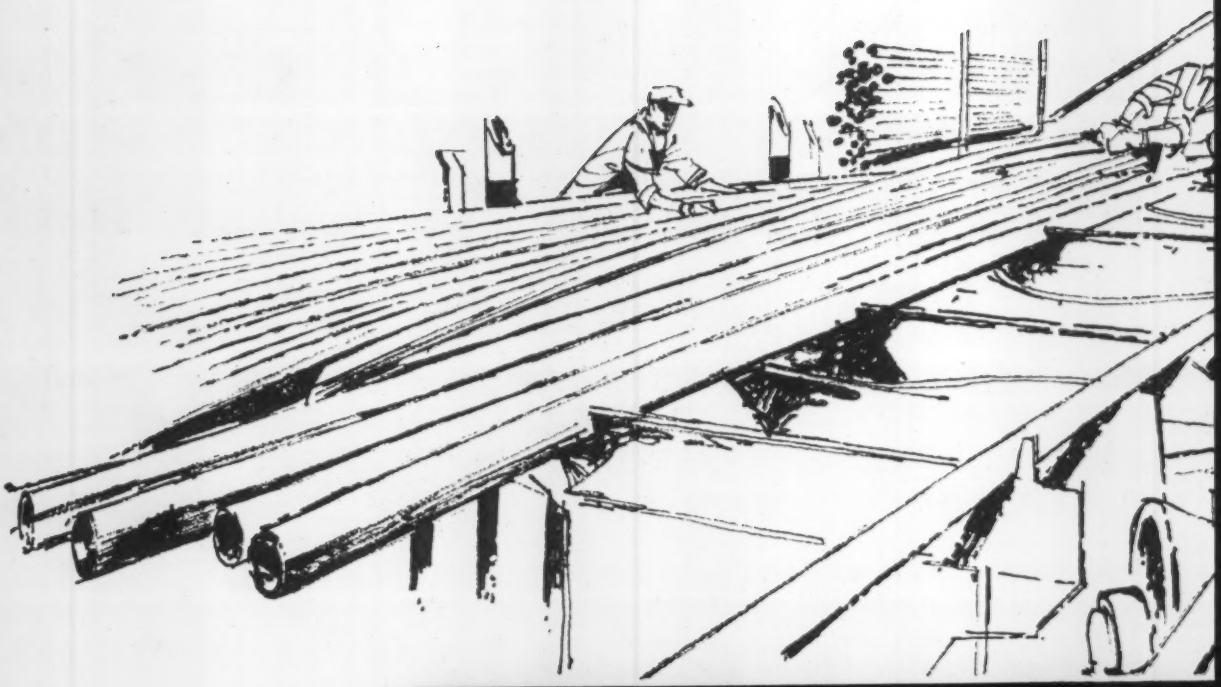
Door-to-door service

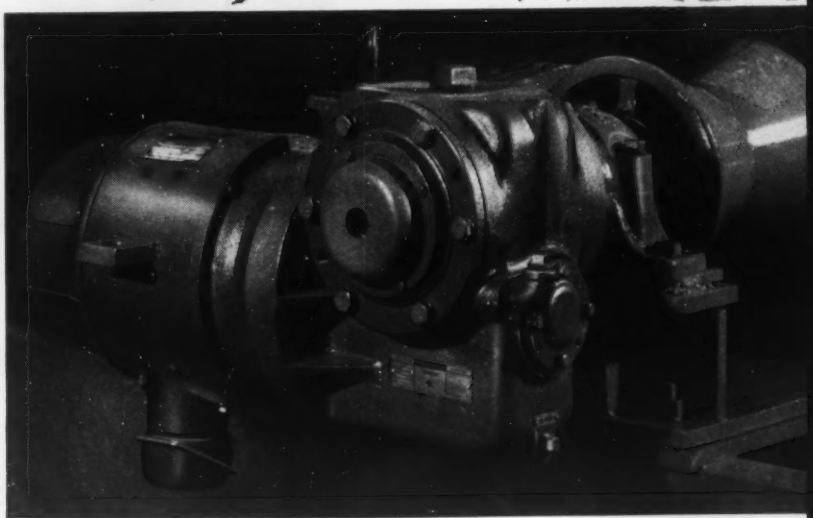
SHIP FAST... SHIP SURE... SHIP EASY

UNITED AIR LINES

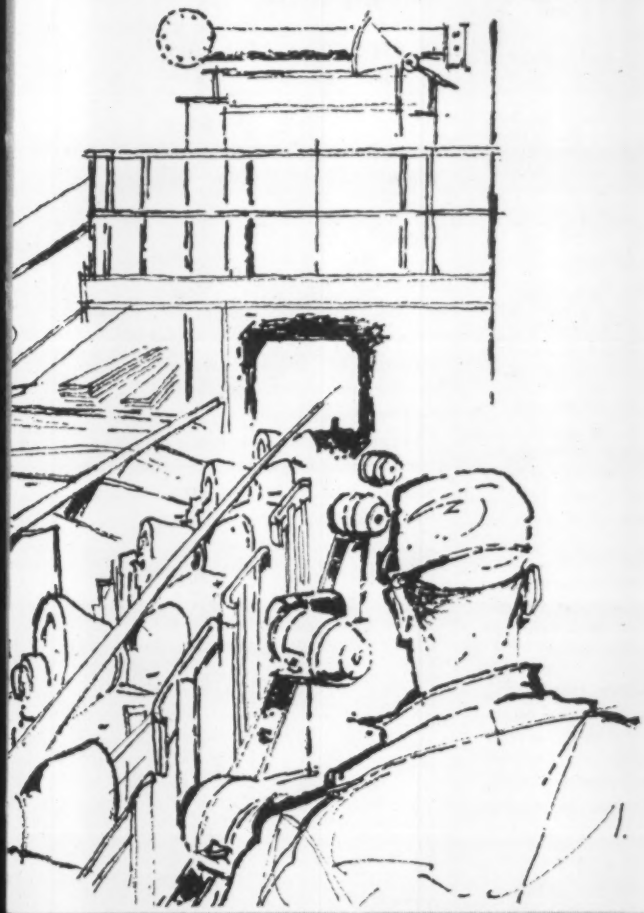
For service, information, or free Air Freight booklet, call the nearest United Air Lines Representative or write Cargo Sales Division, United Air Lines, 36 South Wabash Avenue, Chicago 3, Illinois.

Seamless tube delivery gets **Triple protection in**





Westinghouse floating gearmotors

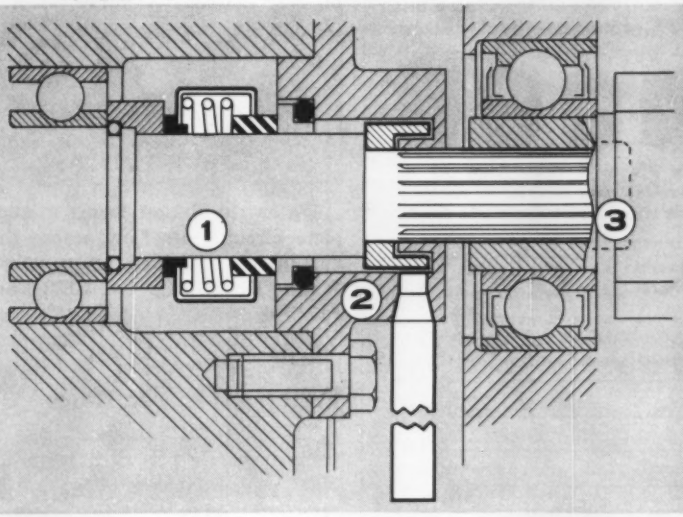


Westinghouse floating shaft gearmotors have undergone the critical tests of 24-hour-a-day, run-out table operations. Typical results come from a seamless tube drawing, tempering and annealing operation. Here, Westinghouse units bring three-way protection against the always-present problems of oil leakage and motor changes.

Two separate seal systems guard against oil leaking from the gear unit into the motor. An indicating feature warns of seal wear, before failure, in time for preventive maintenance.

Westinghouse splined shaft coupling permits easy separation of motor and gear assembly in seconds. Valuable inspection time is saved and motor changes can be made on the job, reducing down time.

Shock-absorbing spring mounting and rugged construction make Westinghouse floating-shaft gearmotors extremely tough . . . but why not see for yourself in Booklet B-6370. Call your local Westinghouse sales engineer for a copy, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-07354



1. A combination labyrinth-packing and face-type seal on the pinion shaft prevents oil leakage from the gear housing into the motor.

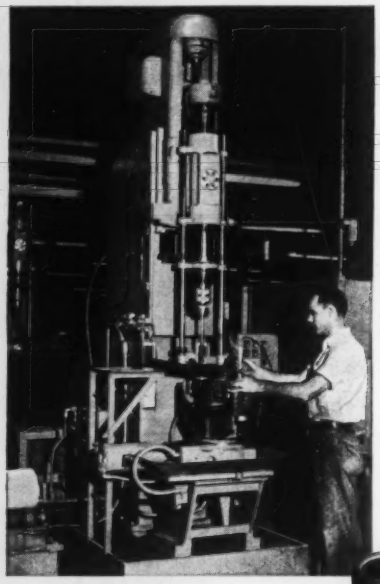
2. For added protection an umbrella seal and drain catches any leakage through a worn shaft seal. Visual indication of seal wear is given by the drain.

3. The simple spline connection between motor and gear shafts permits fast demounting of the motor without disturbing gears or bearings.

YOU CAN BE SURE... IF IT'S Westinghouse

WHY Emerson Electric MICROHONES Laminated Steel Rotors

The Emerson Electric Manufacturing Company is constantly searching for the best possible processing methods. Working with Micromatic engineers on problems encountered in processing shaft holes in their laminated steel rotors, Emerson Electric found that Microhoning would provide much higher production quality while lowering processing costs. The following Microhoning benefits are now obtained:



Model 728 Hydrohoner with automatic Microsize, Microdial and two station rotary indexing fixture. Hole Tolerances: Diameter .0002 inch, straightness and roundness .0001 inch.

CUT REJECTS
With former processing method rejects ran too high. Microhoning controls size and assures a clean hole—rejects are substantially reduced.

ELIMINATED OPERATIONS
Old processing method required two operations. In one operation, Microhoning generates size and straightness within specified tolerances.

REDUCED BALANCING TIME 70%
To preclude vibration and poor operating characteristics, it is essential that shaft hole be concentric with O.D. of rotor. Microhoning reduced by 70% the amount of dynamic balancing correction required.

PROCESSING COSTS CUT 70%
Current figures show the cost of Microhoning shaft holes in rotors to be less than 30% of processing by old method.

Rotors (from 2¼ to 4 inches long) are all Microhoned on the same machine by changing adaptor in fixture and resetting stroke length.

Learn why Microhoning will give you efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE____ D

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

NEW PRODUCTS and equipment

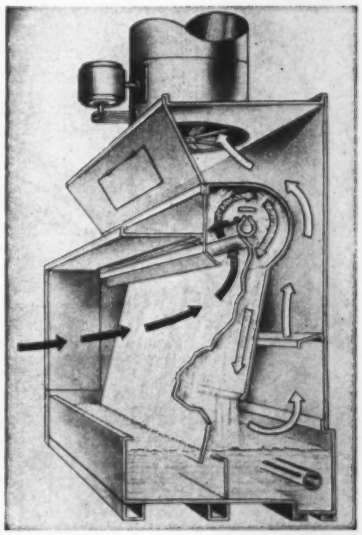
before any oversize or undersize work is produced.

The indicating dial is graduated in 0.000050 in. Indicating limits operate consistently within 5 millionths of their established setting. *Write*: Federal Products Corp., 1144 Eddy St., Providence 1, R. I. *Phone*: Stuart 1-9300

Paint Spray Booth Uses Water Wash

The style E Dynaprecipitator draws air through a continuous curtain of moving water which scrubs out paint particles.

The centrifugal force of rapid changes in the air stream direction throws paint particles against the walls. Water flushes particles into the collecting pan.

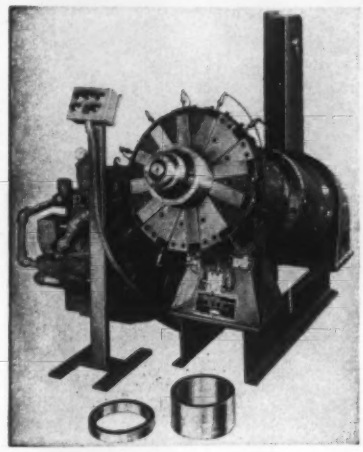


Water circulation forms a complete circuit. Its flow across the curtains is adjusted by a valve. *Write*: Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill. *Phone*: Van Buren 6-4200

Expander Is Versatile

The 15-H-215 expander has a peak draw bar pull of 215 tons at 3000 psi, its maximum hydraulic pressure.

The expander forms and sizes cylindrical, conical and polygonal sheet metal and tubular parts. Part shapes and sizes can have a wide range because the draw bar,



cone, jaws and table are interchangeable.

The expanders can be installed to operate in a vertical, horizontal or oblique position. The machine illustrated can expand 2.5 sq in. of stainless steel having a yield strength of 100,000 psi.

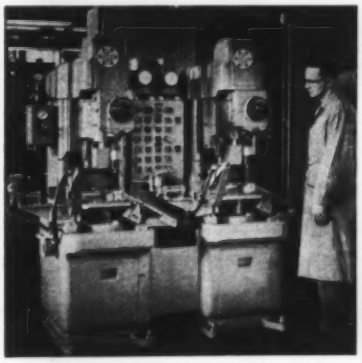
Other models have capacities of 60 to 1450 tons (draw-bar pull). *Write*: Grotnes Machine Works Inc., 5454 N. Wolcott Ave., Chicago 40, Ill. *Phone*: Longbeach 1-7693

Honing Machine

The Model 738 Microhoner generates the bore square with end faces to provide accurate locating surfaces for later operations.

A large-capacity loader and a gravity chute make the loading of parts automatic. Parts are carried to the prefeed position where a plunger moves them onto the fixture table.

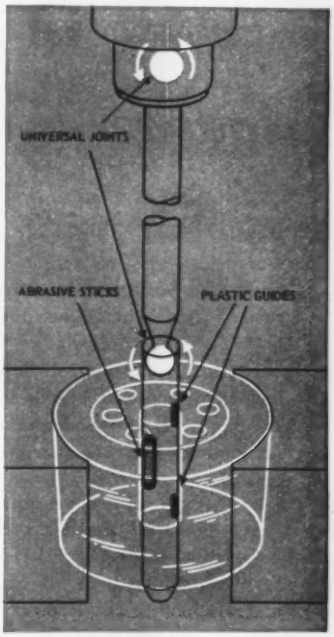
The machining cycle is ended



HOW MICROHONING Laminated Rotors Cuts Processing Costs

Emerson Electric squirrel-cage rotors are made of special "electrical grade" steel laminations and each lamination is coated with oxide insulation. In processing the rotor, the O.D. is turned concentric with the shaft hole. Then, in one operation, Microhoning accurately generates finished size and straightness of shaft hole without any change in hole location.

The Micromold tool has two universal joints in the drive shaft which allow the tool body to align itself with the shaft hole. Microhoning of holes is along same axis from which O.D. was turned.



For electrical and mechanical efficiency, assembled motors must have a uniform air-gap between rotor and stator of .006 inch to .011 inch. Because laminated surface is rough and close tolerances must be held, special guided Micromold tools are used. Plastic guides above and below abrasive sticks, control dressing of abrasive and assure generation of round, straight shaft holes.

Before installing Microhoning equipment, two operations were required to finish shaft hole—rejects ran high. Microhoning greatly reduced the amount of dynamic balancing correction required.

The principles and applications of Microhoning are explained in a 30-minute, 16 mm, sound movie, "Progress in Precision" . . . available at your request.

☐ Please send me "Progress in Precision" in time for showing on_____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME_____
TITLE_____
COMPANY_____
STREET_____
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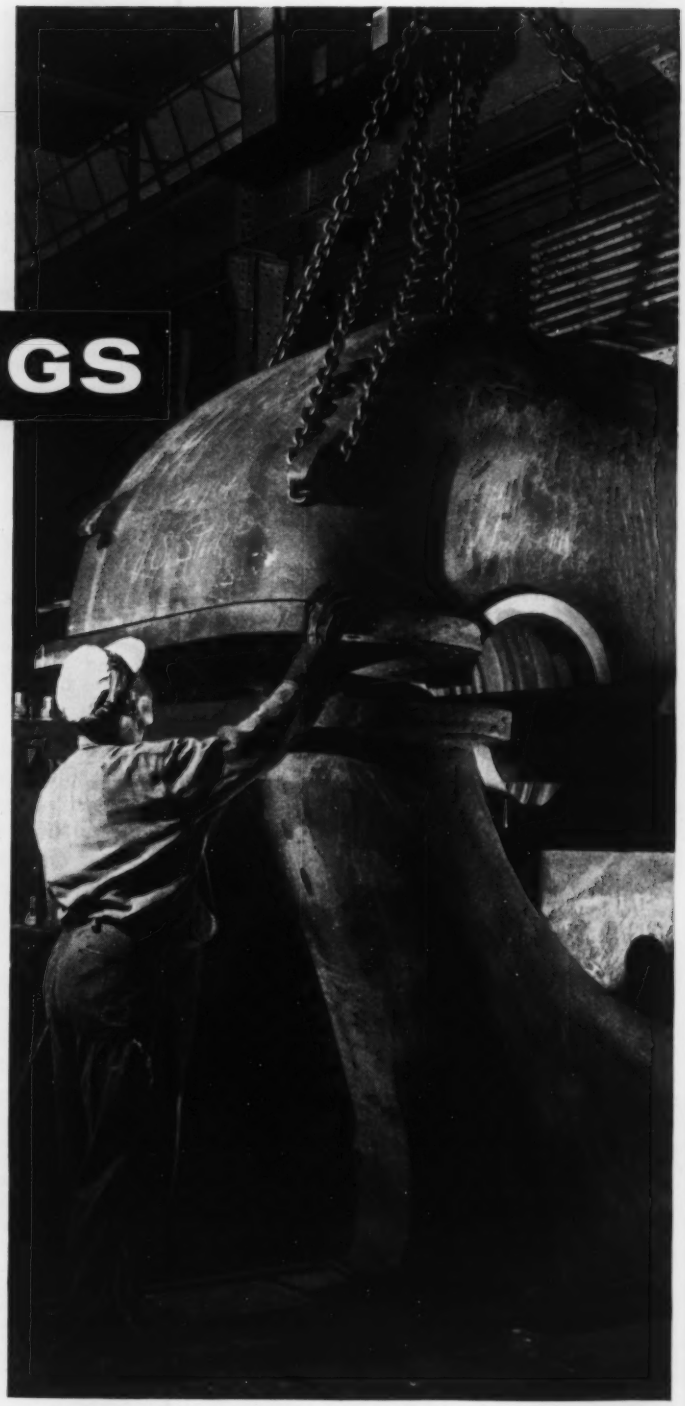
MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

Ingersoll-Rand does

BIG THINGS

with Hanna pig iron



Castings made in the Ingersoll-Rand foundries vary in weight from a few ounces to 30 tons. But one thing that never varies is the quality of I-R castings. For over 30 years, Hanna Furnace has been furnishing Ingersoll-Rand with ever-increasing amounts of pig iron that has the high metallurgical qualities and exact analyses required for its engineering grades of iron.

Hanna's wide product range includes the Hanna 38-lb. pig, the foundryman's favorite standard, in all grades, silvery and HannaTite, our special controlled, close-grain iron. Also the HannaTen ingot, a 10-pounder with finer grain structure and no free carbon pockets. The HannaTen also is available in all grades, silvery and HannaTite.

Our customers know that Hanna and its representatives are eager to be of service to them.

Turbine castings, totalling 55 tons, being checked in a test assembly after final machining at the Ingersoll-Rand plant at Phillipsburg, N.J.

HANNA
THE BEST KNOWN NAME IN IRON

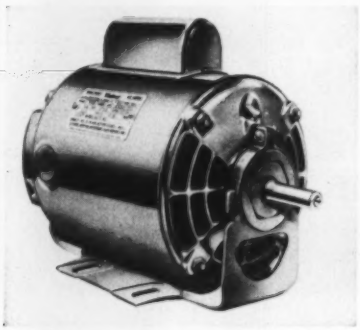
THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

when the bore is to the required diameter. An air gage automatically inspects the finished part while the next part is being honed. The air gage sorts parts according to their bore diameters as they leave the machine.

The machine shuts down automatically when the abrasive is worn or when a predetermined number of parts are not within tolerances. *Write*: Micromatic Hone Corp., 8100 Schoolcraft, Detroit 38, Mich. *Phone*: Webster 3-7835

Fractional Motors

These motors (NEMA frame size 48) have ratings of 1/6, ¼ and ⅓-hp. Both capacitor and split-phase motors are available in rigid and resilient base models.



Mylar-paper laminated slot insulation provides high dielectric strength, moisture resistance and thermal stability. *Write*: Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo. *Phone*: Parkview 1-5000

Welder Is Semiautomatic

Both CO_2 and inert-gas arc welding are done by this unit which will operate with any constant voltage, direct current source.

In consumable electrode welding, an electrode drive unit feeds the electrode into the arc at a constant, preselected speed. Automatic features: Starting and stopping of the arc, adjusting electrode feed, inching the electrode, controlling the arc weld power and the flow of shielding gas.

Speed of the wire feed and arc voltage can be controlled at the work. The dual control is pro-

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
½ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... CM Trolleys and Cranes

WRITE OR WIRE FOR COMPLETE CATALOG AND NAME OF YOUR LOCAL DISTRIBUTOR

CM HOISTS AND CHAIN

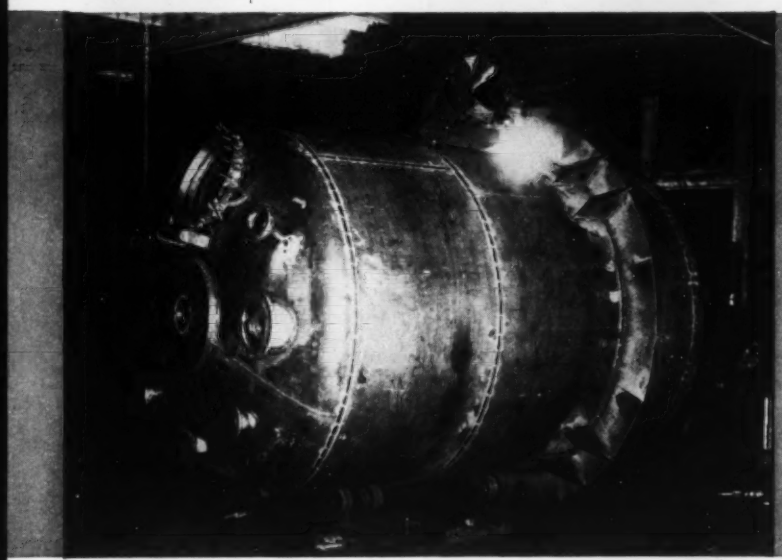
CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

CF&I LECTRO-CLAD*

AN INSIDE JOB—Welding on the inner, Lectro-Clad surface of a caustic evaporator. Regular manual arc welding with Inco "141" nickel electrodes preserves the continuity of the nickel plating. Prior to welding the nickel side, the plate edges are prepared by flame cutting and bevelling, welding is completed on the steel side, and the nickel is back chipped to sound steel weld metal.

reduces delivery time by one year

—New Jersey fabricator uses CF&I NICKEL PLATED STEEL PLATES for caustic evaporator



A welder at the L. Lawrence Company puts the finishing touches on an 8-foot diameter caustic evaporator. Heads and plates are all fabricated from CF&I Lectro-Clad, nickel plated on all inside surfaces for protection against contamination. Rolling, shearing and severe forming of Lectro-Clad are easily accomplished, using normal steel fabricating methods — the nickel plating *will not* check, spall or flake.

■ Instead of waiting a year for hard-to-get, expensive nickel, the L. Lawrence Company, Inc., of Newark, New Jersey used ⅜-inch steel plates with a .015-inch, Lectro-Clad nickel plating in making a caustic evaporator for a large chemical company. Results—a completely successful evaporator . . . *at lower cost . . . delivered a year sooner than expected . . . fabricated with standard procedures.*

The Lectro-Clad nickel plating on the inside surface of the evaporator does the same job as solid nickel or nickel-clad steel in protecting against discoloration and contamination . . . the carbon steel plates give structural strength and durability. What's more, you can expect plate delivery in six weeks when you order CF&I Lectro-Clad.

If you use, or fabricate, heavy industrial equipment where product contamination is a problem, you can probably use CF&I Lectro-Clad to good advantage. For further details, write for the Lectro-Clad Technical Manual, Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware. 4372

***NICKEL PLATED BY THE BART LECTRO-CLAD PROCESS**

Claymont Steel Products

CF&I

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Casper • Chicago • Denver • Detroit • El Paso • Ft. Worth
Houston • Lincoln • Los Angeles • New Orleans • New York • Oakland • Odessa • Oklahoma City • Philadelphia • Phoenix • Portland (Ore.
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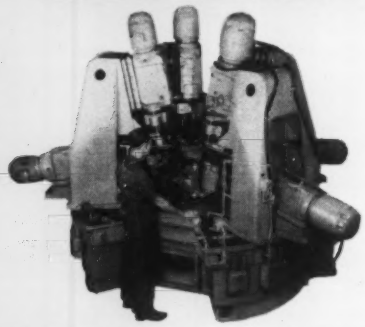
CF&I OFFICES IN CANADA: Toronto • Montreal
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

OTHER CLAYMONT PRODUCTS

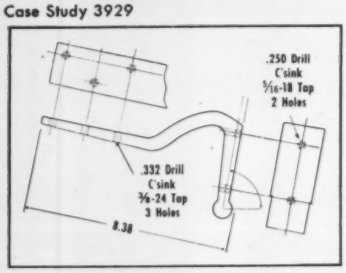
Stainless-Clad Plates • Manhole Fittings and Covers • Large Diameter Welded Steel Pipe • Fabricated Steel Parts • Flanged and Dished Heads • Alloy Steel Plates • High Strength Low Alloy Steel Plates

Two hinges drilled, countersunk and tapped every 11½ seconds ...automatically on a

KINGSBURY



Case Study 3929



620 PARTS PER HOUR GROSS

Each fixture holds two parts at the angle shown in the sketch. This allows room for four vertical units. These units operate on the three parallel holes. Four angular units operate on the two parallel holes. Two-step drilling shortens the time cycle and increases the production rate. The operator unloads a finished part, loads a rough one and pushes a button to index the table. After the table indexes, all units operate automatically.

All Kingsbury machines are completely tooled and ready to produce. We run test samples and ship them to you for your approval before we ship the machine. For high production drilling and tapping, a Kingsbury is the best machine you can buy. Kingsbury Machine Tool Corporation, Keene, N. H.

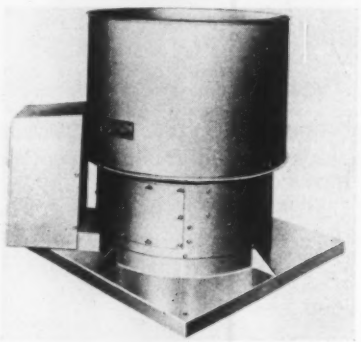
KINGSBURY
INDEXING AUTOMATICS
for high production drilling and tapping

NEW PRODUCTS and equipment

vided to save the operator time and steps between the welding operation and the source of welding power. *Write*: Hobart Bros. Co., Hobart Square, Troy, O. *Phone*: 2-1223

Roof Ventilator

Model VRV is an upblast exhaust ventilator that discharges corrosive or oil and grease-laden fumes at high velocity. This prevents re-entry of the fumes through the supply ventilators.



There are 16 sizes. The largest delivers 52,200 cfm at zero static pressure. *Write*: American Blower Corp., Detroit 32, Mich. *Phone*: Trinity 2-4300

Horizontal Seam Welder

The MX-400 is a resistance welding machine that can apply a maximum electrode force of 3000 lb with 80 psi of air pressure.

Upper and lower electrode wheels have silver contacts. They can weld at 144 ipm. The upper electrode wheel is driven by an internal gear drive. Torque is transmitted to the welding wheel by a tubular

DO IT YOURSELF and SAVE SAVE SAVE

Paul W. Unruh Jr.

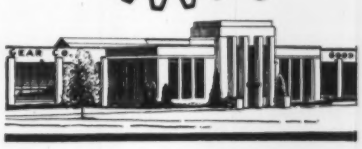
VICE-PRESIDENT, THE CINCINNATI GEAR CO.

News Item: *Statistics show that hospital emergency wards do a rushing business on weekends — and not just after Saturday midnite, either, but* all *weekend long — patching split heads, wrenched backs, mashed thumbs, broken arms and chopped feet. All this "business" results from that modern phenomena, "do it yourself."*

Any fool knows that "do it yourself" is the way to "Save - Save - Save," as the TV commercials say. But some of the *smarter* people have discovered that "do it yourself" isn't necessarily the bargain-counter proposition it's been made out to be — that the fun you get out of it (if any) generally costs *money* in the long run. These people are relearning a truth established years ago that the Division of Labor, or specialization, results in greater efficiency. This holds just as true in the production of industrial goods such as gears: the actual cost, hidden as well as apparent, of gears produced in a back shop or part-time department is bound to be greater than the ultimate cost of gears produced by an efficient, highly-specialized gear manufacturer like Cincinnati Gear. And combine the economic advantages that result from our efficient production and consistent top quality with the *ease-of-mind* that results from our traditionally top-notch *service*, and you'll understand why so many firms (firms who recognize "do it yourself" for what it is) depend on us year after year for all their custom gear requirements.

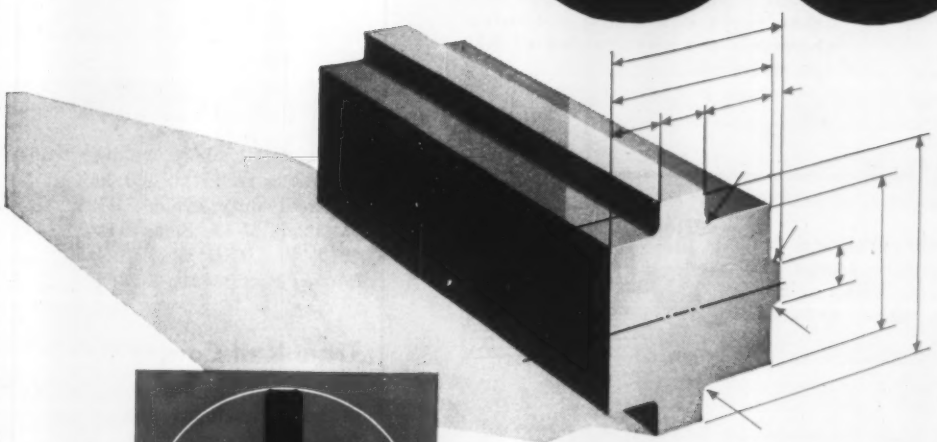
THE CINCINNATI GEAR CO.
CINCINNATI 27, OHIO
Fifty Years of "Gears—Good Gears Only"

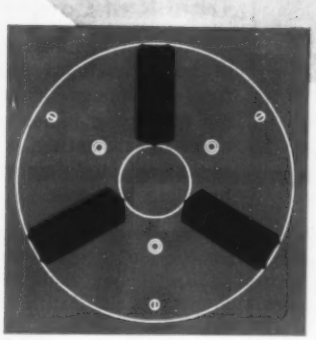
CINTI®



J&L hot extruded, cold drawn chuck jaw section reduced milling cost

35%





Manufacturer reports, "We are extremely pleased with this purchased 'extruded' jaw stock. We now enjoy a 35% cost reduction on our jaw milling operations . . . and the surprising straightness of the extruded bars improves our product."

Here's how these exclusive J&L steel sections can reduce your costs:

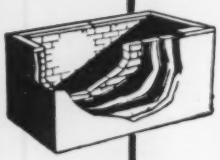
1. Eliminate machining and finishing operations.
2. Reduce scrap losses almost to zero.
3. Eliminate cost of casting and forging intricate sections.
4. Reduce inventories because extrusions are quickly available.

Investigate this new production technique for your shape profiles—within present limits of a design which can be inscribed in a three-inch circle. You'll surely boost production, cut over-all cost. For complete details write to the Jones & Laughlin Steel Corporation, Dept. 404, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

Jones & Laughlin STEEL ...a great name in steel

plant wide protection from corrosion

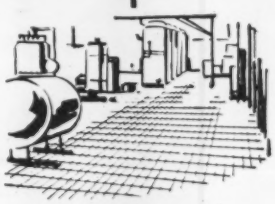
TANKS



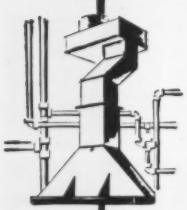
all types of pickling, plating, chemical processing, storage and other tanks containing corrosive chemicals are constructed of Atlas materials.

FLOORS

industrial floors are designed to resist attack of a wide range of corrosive spillage, including acids, alkalies, solvents, salts, greases and detergents.



HOODS, DUCTS, FUME SYSTEMS



completely resistant self-supporting rigid plastic structures are designed and fabricated to meet your specific requirements . . . complete plastic pipe systems including flanges, valves and fittings are also available.

PLANT INTERIORS

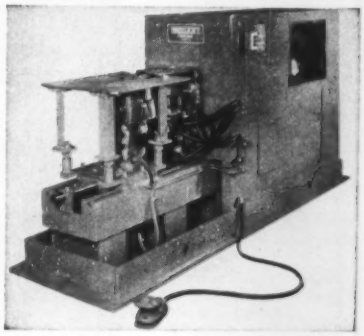
protection of all corrodible surfaces is possible by using the proper Atlas coating . . . vessel exteriors, walls, beams, ceilings can be coated for lasting service.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

Atlas provides a complete corrosion service from on-the-spot technical advice through engineering design to complete construction facilities to carry the job from beginning to end.

ATLAS PRODUCES THE MOST COMPLETE LINE OF CORROSION PROOF MATERIALS OF CONSTRUCTION AVAILABLE FROM ONE MANUFACTURER

NEW PRODUCTS and equipment



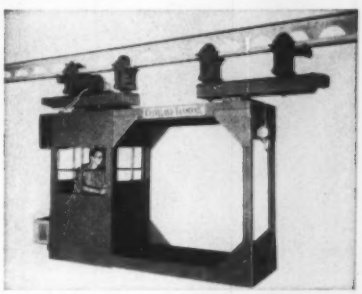
driveshaft threaded though the hollow ram.

The lower wheel, the idler, is inclined to clear the part being welded.

The single phase welding transformer is rated at 400 kva at 50 per cent duty cycle. *Write*: Department M-14, Sciaky Bros. Inc., 4915 W. 67th St., Chicago, Ill. *Phone*: Portsmouth 7-5600

Tram Rail Carrier

This unit has a capacity of 3100 lb and travels at speeds to 300 fpm. Although it was designed for conveying ladles of hot metal used in diecasting, the platform can be adapted for other material handling purposes.



The air-conditioned cab keeps the operator cool while transporting molten metal. *Write*: Cleveland Tramrail Division, Cleveland Crane & Engineering Co., E. 289th St., Wickliffe, O. *Phone*: Wickliffe 3-3700

Grinding Wheel

A series of separate rubber segments grip the coated abrasive and form the cutting surface of the Flexcore grinding wheel.

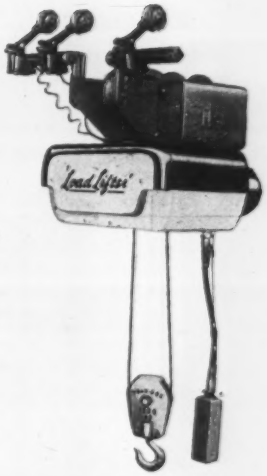
Individual segments can be re-

Keep Work Moving ***FAST!***

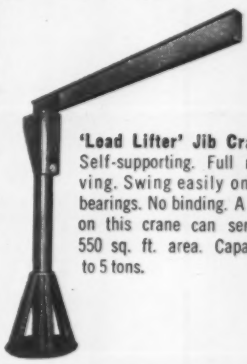
The Series "600" 'Load Lifter' Electric Hoist speeds production — lifts ½-ton loads at 30 FPM at the push of a button. Safe 24-volt push-button control starts this fast hoisting instantly. Two powerful, independently operating brakes are provided for extra safety. Each alone can hold the full load.

The "600" 'Load Lifter' is ruggedly built to meet industry's need for long-term hoisting economy and freedom from costly maintenance. Servicing is easy and safe in the air. No need to take the hoist down. Power and operating costs are low because the "600" mechanism is simple and frictional losses are minimized.

If you want lug or hook suspension, plain trolley or motor-driven trolley — you can have the "600" 'Load Lifter' to fit the need. Also available are current collectors, conductor cord trolleys and other devices to give you efficient, money-saving hoisting equipment from a single source. Capacities ½ and 1 ton. *Ask your "Shaw-Box" Distributor for complete details or write us for Bulletin 408.*



Series "600" 'Load Lifter' Electric Hoist with motor-driven trolley. Trolley available separately for hoists already in service. Installation takes only two hours with common tools.



'Load Lifter' Jib Cranes. Self-supporting. Full revolving. Swing easily on ball bearings. No binding. A hoist on this crane can serve a 550 sq. ft. area. Capacities to 5 tons.

Cord Reels to keep the hoist conductor cord taut and up out of the way of work and worker. Also useful for small cranes and other devices with motors up to 1 HP.

57 F-1

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

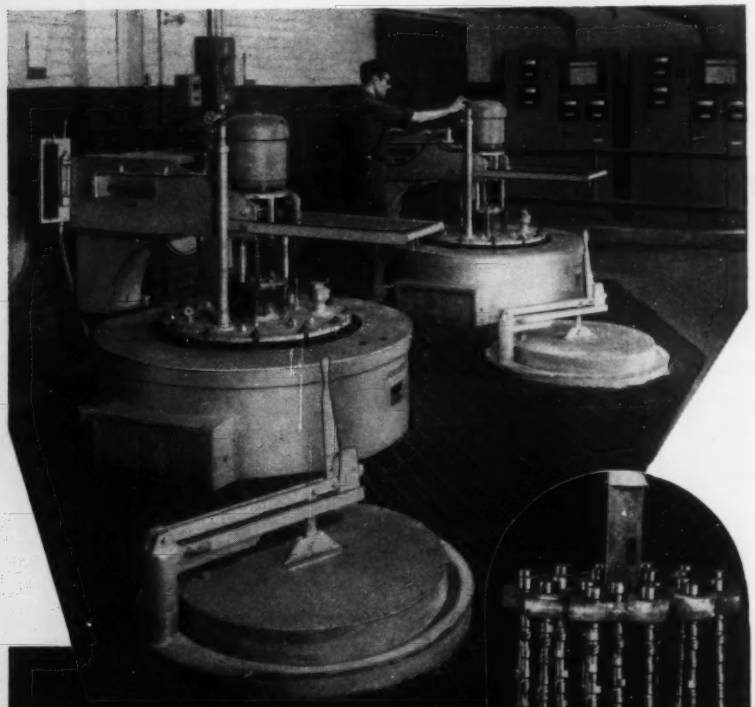
MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

384 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*



Carburizing Control

IMPROVED

at

WAUKESHA MOTOR CO.

with **HEVI-DUTY**®

VERTICAL RETORT FURNACES

Cam shafts in furnace fixture ready for carburizing

When Waukesha Motor Company planned their own heat-treating department to carburize cam shafts, they chose Hevi-Duty Vertical Retort Furnaces because:

1. Positive pressure within the retort assures entrance of only the carburizing medium and the carrier gas. By simple regulation, conditions within the retort can be easily duplicated, assuring uniform results from heat to heat.

2. Multiple zone control assures even temperature from top to bottom of the load to produce uniform case.

3. Forced circulation assures penetration of atmosphere in the densest of loads.

4. Time and temperature control is accurate, assuring the desired case depth and carbon concentration.

5. Versatility of this furnace allows its use for other heat-treating operations, such as nitriding, hardening and annealing.

Bulletin 646 describes other advantages of Hevi-Duty Vertical Retort Furnaces. Write for your copy today.

HEVI DUTY ELECTRIC COMPANY

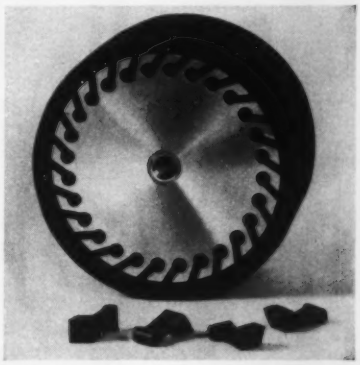
MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers ***Constant Current Regulators***

placed as needed. They come in a variety of hardnesses and can be used in combinations to obtain different cutting actions.

Fast cutting is achieved by using hard segments and soft segments in alternate slots.



The wheel can be operated at slow speeds because a complete peripheral contact is made with the coated abrasive band.

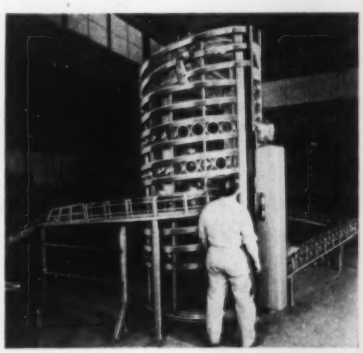
Wheel diameters: 3, 4, 5 and 6 in. Widths are made to any specification. *Write*: Nu-Matic Grinders Inc., 8224 Carnegie Ave., Cleveland 3, O. *Phone*: Randolph 1-0980

Storage for Automation

This rotary unit provides demand feeding for parts or blanks that can roll. To meet different space requirements, it comes in two forms—circular and oval.

Parts are guided through a silhouette accept-reject device to fully caged double tracks and are gravity fed to the elevator. The variable speed elevator works off a stroke-lift pneumatic piston.

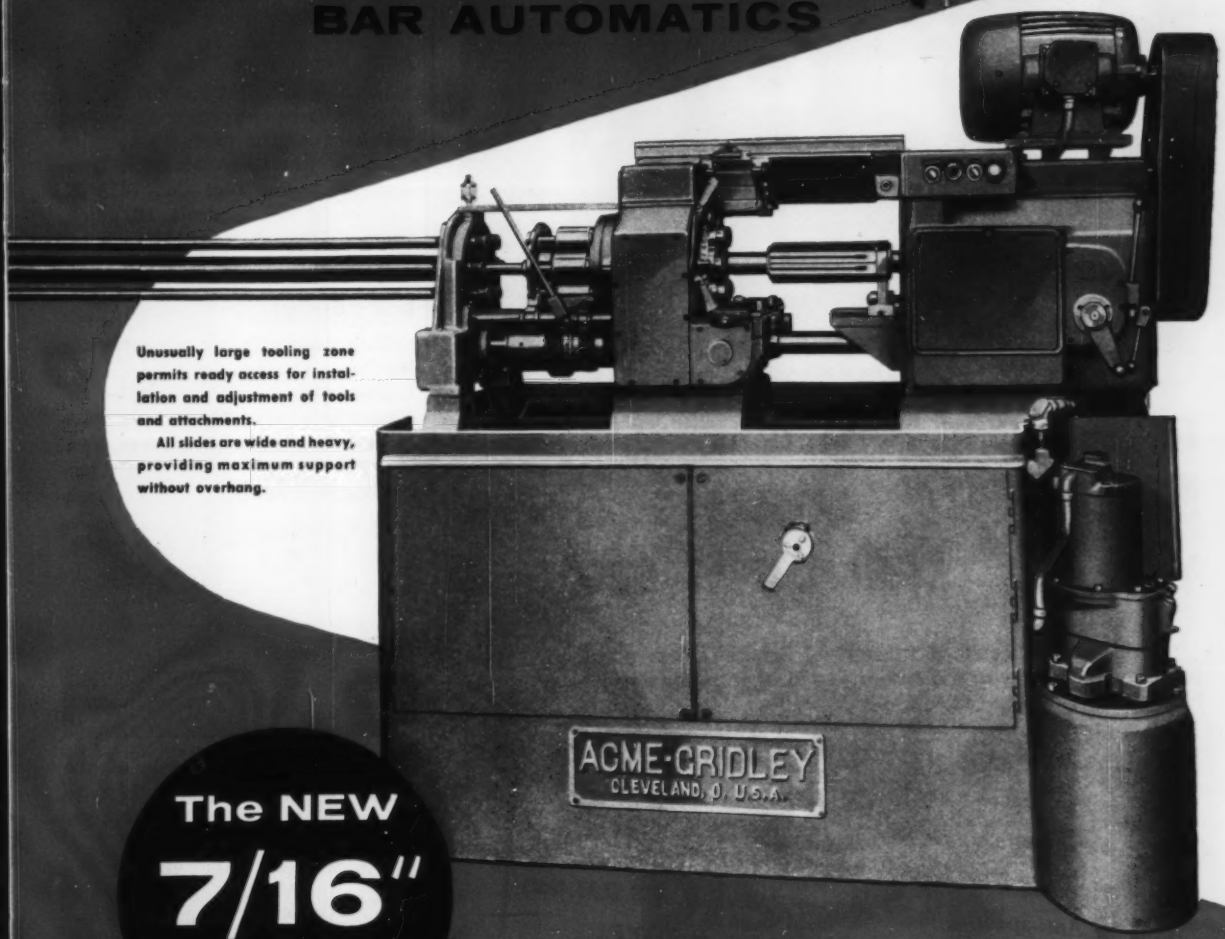
As parts leave the elevator at the top of the unit, they are gravity rolled through the circular



LIKE ALL

Acme-Gridley

BAR AUTOMATICS



Unusually large tooling zone permits ready access for installation and adjustment of tools and attachments.

All slides are wide and heavy, providing maximum support without overhang.

The NEW 7/16" SIX

...gives you

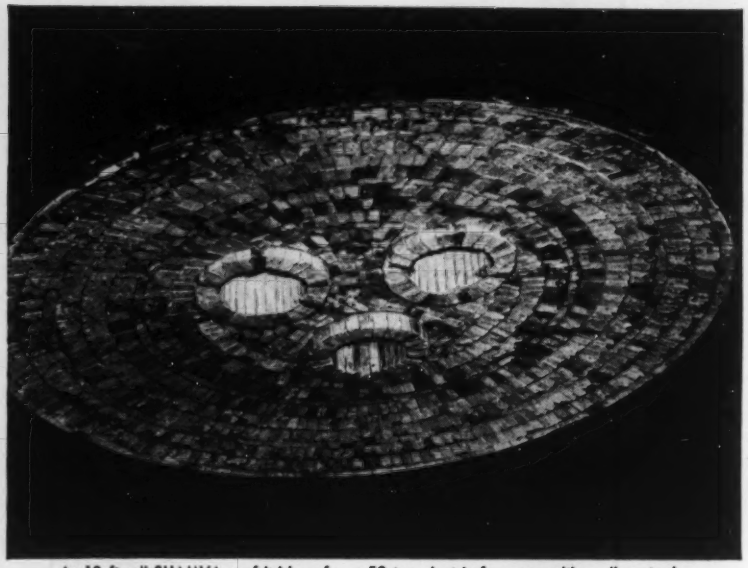
1. wide tooling versatility
2. high production accuracy
3. long operating dependability

Built to meet the demand for a smaller factor multiple, the new 7/16" RA-6 machine has taken its place in the Acme-Gridley line—chosen by production men who daily prove the advantages of National Acme's "complete line" experience to furnish the right machines for the job.

Write for your copy of Bulletin MRA-56 which illustrates and describes the new 7/16"-Six.

National Acme

THE NATIONAL ACME COMPANY, 189 E. 131ST ST., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.



An 18-ft. all-SHAMVA roof laid up for a 50-ton electric furnace melting alloy steels.

In electric furnace operations

SHAMVA MULLITE GIVES YOU OUTSTANDING SERVICE

"Shamva" Electric Furnace Roof Brick is a coarse and open type refractory, giving you the extreme spalling resistance necessary in top charge electric furnace roofs.

- *High fusion point (3335°F.)*
- *High softening point (over 3000°F.)*
- *Low coefficient of expansion (3.66 x 10^{-6} per °C.)*
- *Anti-spalling (0.7% at 3000°F. Preheat, A.S.T.M. test)*
- *High load bearing strength (—3.1%, at 3000°F., 1½ hrs., 25 p.s.i. A.S.T.M. test)*
- *Low heat conductivity for greater furnace efficiency*

With "Shamva" Mullite Brick, roof life and production increase, down time and labor costs decrease.

Let our field engineers assist in your refractory installation.

WRITE TO: *Mullite Works, Laclede-Christy Division, H. K. Porter Company, Inc., Shelton, Conn.*

Distributors in principal cities

HKP MULLITE WORKS LACLEDE-CHRISTY DIVISION H. K. PORTER COMPANY, INC.

NEW PRODUCTS and equipment

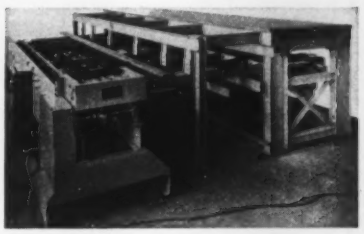
tracks to the exit chute. Parts can be positioned vertically or horizontally for the following operation. Gates in the tracks control movement of the parts.

When stockpiling parts, the equipment stops automatically when it is full. The static weight of parts is used to move air valves which cause the gates to open or close. *Write*: Gear-O-Mation Division, Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Bar Feeder

This automatic bar hopper feeder has three sections.

The hopper on the right is designed to receive 10,000-lb bundles of round steel bars or tubes 2 in. in diameter and 20 ft long from an overhead crane.



The bottom of one side of the hopper is open to permit bars to be transferred from the hopper to the transfer table.

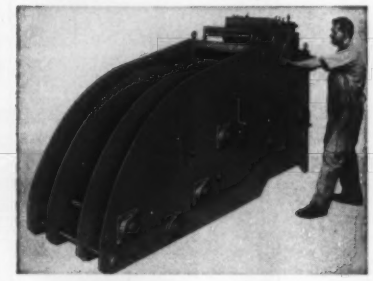
The transfer table meters the bars to the V-rolls. They feed the bars to a cutoff machine or furnace. *Write*: Spurgeon Co., 23501 Hoover Rd., Van Dyke, Mich. *Phone*: Jefferson 6-6250

Cradle and Straightener

This combination cradle and straightener automatically supplies controlled slack loops of straight, flat stock from which any machine can draw. Coils up to 60 in. in diameter and 18 in. wide are accommodated. Maximum stock thickness is 0.045 in.

The Variloop Control delays motor shutoff up to 10 seconds after the slack loop is formed. This prevents unnecessary motor starts and stops, smooths out material flow and eliminates wear.

Four supporting rolls in the



cradle, seven straightening rolls and two punch rolls are power driven. Stock is fed at 20 to 100 sfpm. *Write*: Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif. *Phone*: Plymouth 6-8134

Variable Speed Motor

The Slo-Speed gearmotors and the Speed-Trol variable speed motors with reducer are used for severe radial loads. Bearing construction on the speed reducer is extended.

Radial load capacity and rigidity are increased because the distance between bearings on the output shaft has been lengthened.

The need for secondary support bearings is minimized. Units with up to 15 hp are available.

Constant and variable speed models have speeds of 20 to 350 rpm. *Write*: Sterling Electric Motors Inc., 5401 Telegraph Rd., Los Angeles 22, Calif. *Phone*: Raymond 3-6211

Transfer Machine

This 13-station machine holds tapped holes in forged steel or cast iron crankshafts concentric with the bored center hole.

The machine drills, bores, chamfers, reams and taps 112 pieces an hour.

Three two-way machining units and one one-way unit make up the hydraulically operated machine.

The two-way units are for drill-

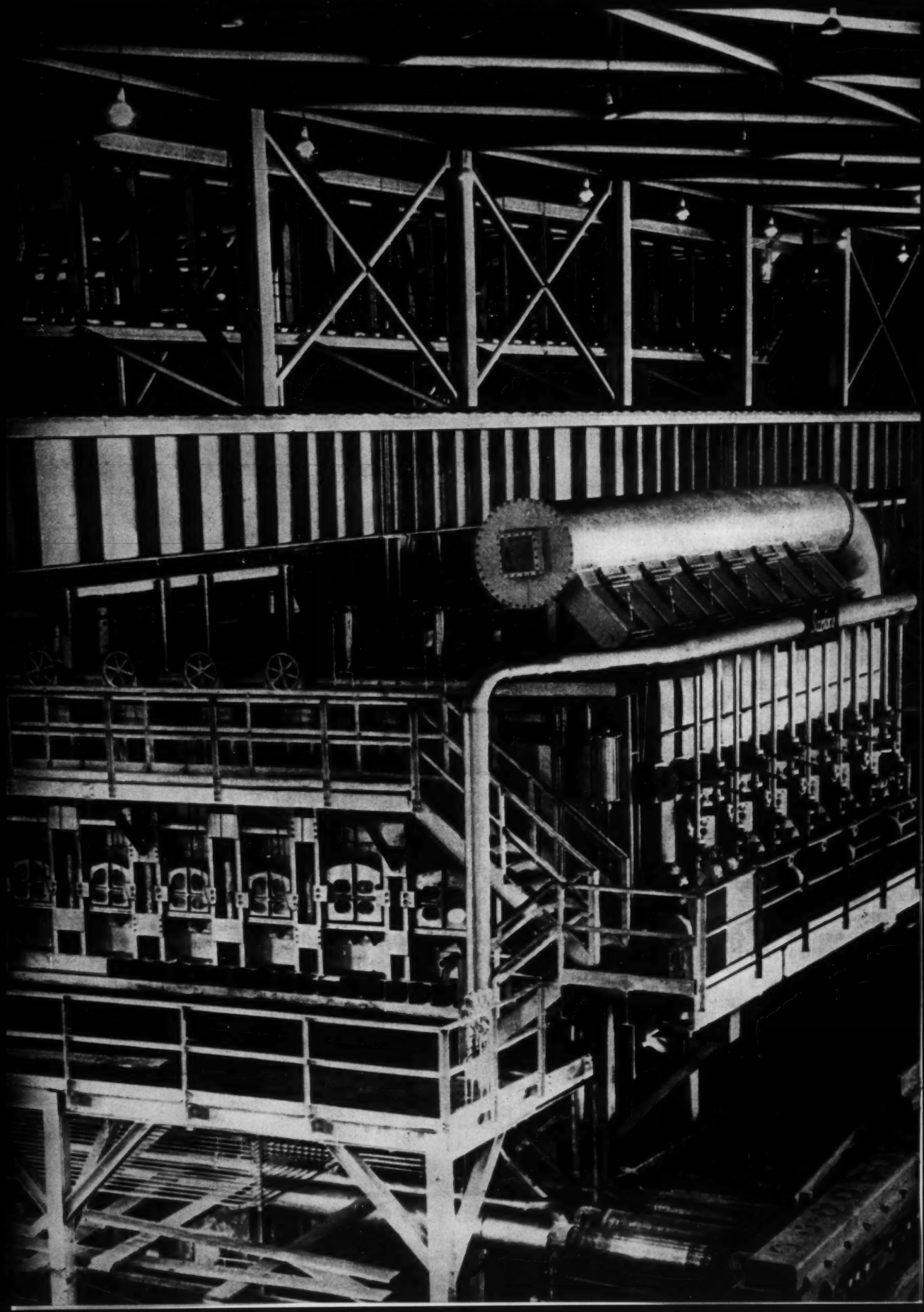
For easy, economical machine shop cutting use one of these 8 sturdy

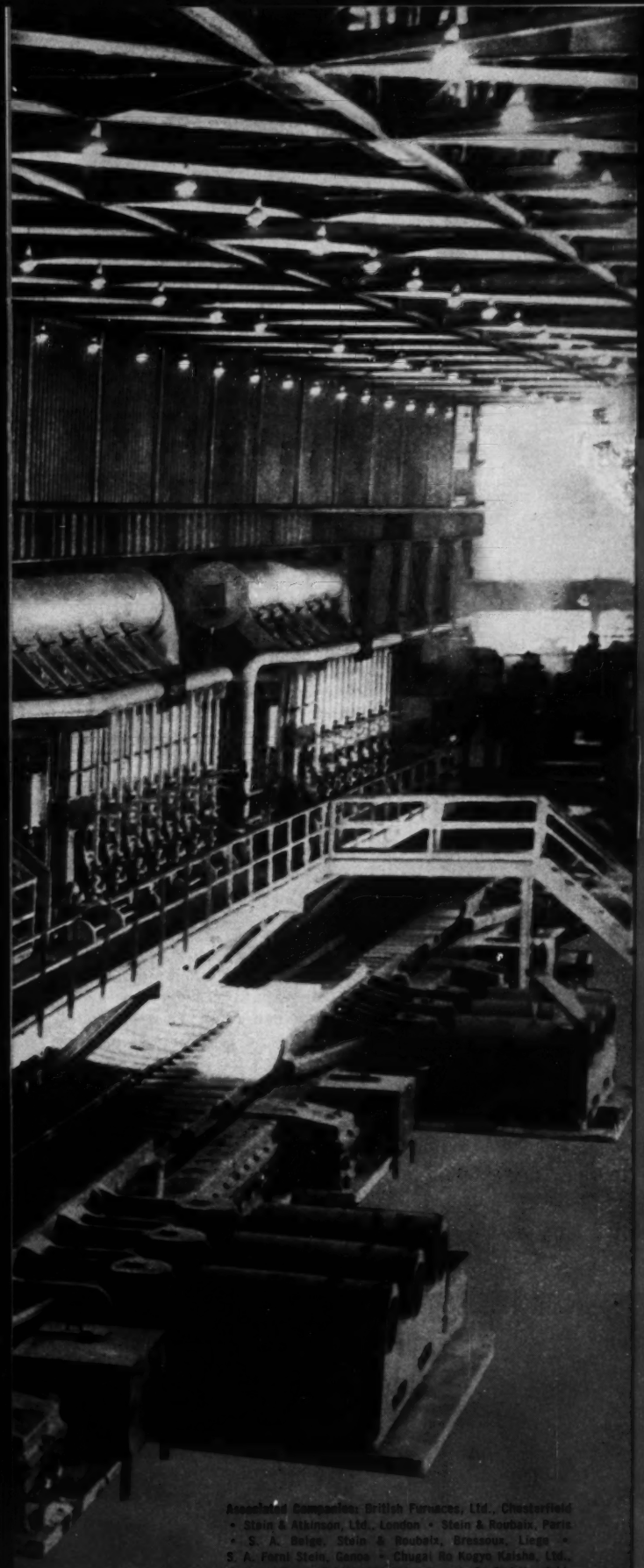
DISSTON
HACK SAW BLADES

They cut easily...resist wear and breakage. Get them through your industrial distributor.

Write for latest folder and hack saw selector today.
Henry Disston Division
H. K. Porter Company, Inc.
Philadelphia 35, Pa.

HKP Henry DISSTON DIVISION
H. K. PORTER COMPANY, INC.





200 TONS AN HOUR CONTINUOUSLY

200 tons of steel slabs are heated to rolling temperature every hour, continuously, in each of these Surface monsters—world's largest slab furnaces.

No other furnace today can list all of these features:

1 Cantilever skid supports* permitting unobstructed combustion space for underfiring.

2 Furnace lines and burner design which provide high heat input from the moment the slab enters the furnace.

3 Built-in control* to prevent intermingling of gases from upper and bottom zones, providing better control of heat application, and preventing overheated slab end.

4 Anticipatory control which reduces temperature head when rate of slab discharge decreases.

5 Air preheat up to 1100°F.

6 Television signal to pusher pulpit, informing operator of the exact position of the leading slab.

About the only conventional feature in these giants is the fact that the slabs are pushed in one end and out the other.

This is another demonstration that, at Surface, unconventional thinking and conventional experience are a productive team for the steel industry. Surface Combustion Corporation, Toledo 1, Ohio.

*patents pending

Surface
STEEL MILL EQUIPMENT

Associated Companies: British Furnaces, Ltd., Chesterfield • Stein & Atkinson, Ltd., London • Stein & Roubaix, Paris • S. A. Belge, Stein & Roubaix, Brassoux, Liege • S. A. Forni Stein, Genoa • Chugai Ro Kogyo Kaisha, Ltd., Osaka • Benno Schilde Maschinenbau, A. G., Bad Hersfeld

NOTHING BUT STEEL

keeps this thundering giant on its appointed course!

Roaring out of the night at 70 miles an hour, the freight train of today is moving thousands of tons — dependent entirely upon the strength, hardness, and toughness of the steel rails to keep it on its path!

NOTHING BUT STEEL

can do the job of steel!

TRU-STEEL, the pioneer high carbon, full heat-treated steel shot has the solidity, hardness and toughness that nothing but steel has — because

TRU-STEEL SHOT is TRUE STEEL, of tool steel quality

NOW IN 50 POUND BAGS

Write for full information on TRU-STEEL and what it can do for YOU in YOUR cleaning operation!

TRU-STEEL

Manufactured by

STEEL SHOT PRODUCERS, INC.

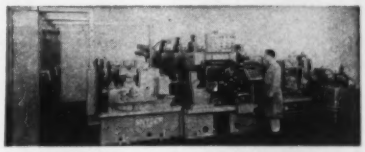
Butler, Pa.

Subsidiary of Pittsburgh Crushed Steel Co.

Pittsburgh 1, Pa.

Sold by Pangborn Corporation, Hagerstown, Md., and by leading distributors of foundry supplies from coast to coast.

NEW PRODUCTS and equipment

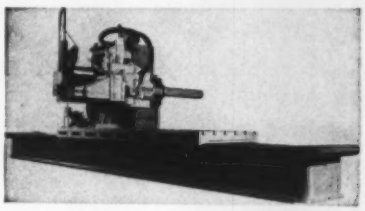


ing and boring; the one-way unit does multiple drilling and chamfering. *Write*: Synder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. *Phone*: Lorain 7-0123

Unit Machines, Profiles or Contours

Steel, aluminum and titanium can be machined with this profiler. It has a 20-hp hydraulically powered spindle with speeds of 37 to 3000 rpm.

The operator manually traces a template (using a highly responsive tracing valve), and the cutting tool machines, profiles or three-dimensional contours with an accuracy of −0.005 in.



The spindle is mounted on arc-shaped ways for swarf or twist cuts and can pivot 20 degrees on either side on the vertical centerline.

The 42 x 144 in. table has 136 in. travel. Table feed is 0 to 40 ipm. *Write*: Arrow Engineering Co. Inc., 120 E. Market St., Indianapolis, Ind. *Phone*: Melrose 8-6463

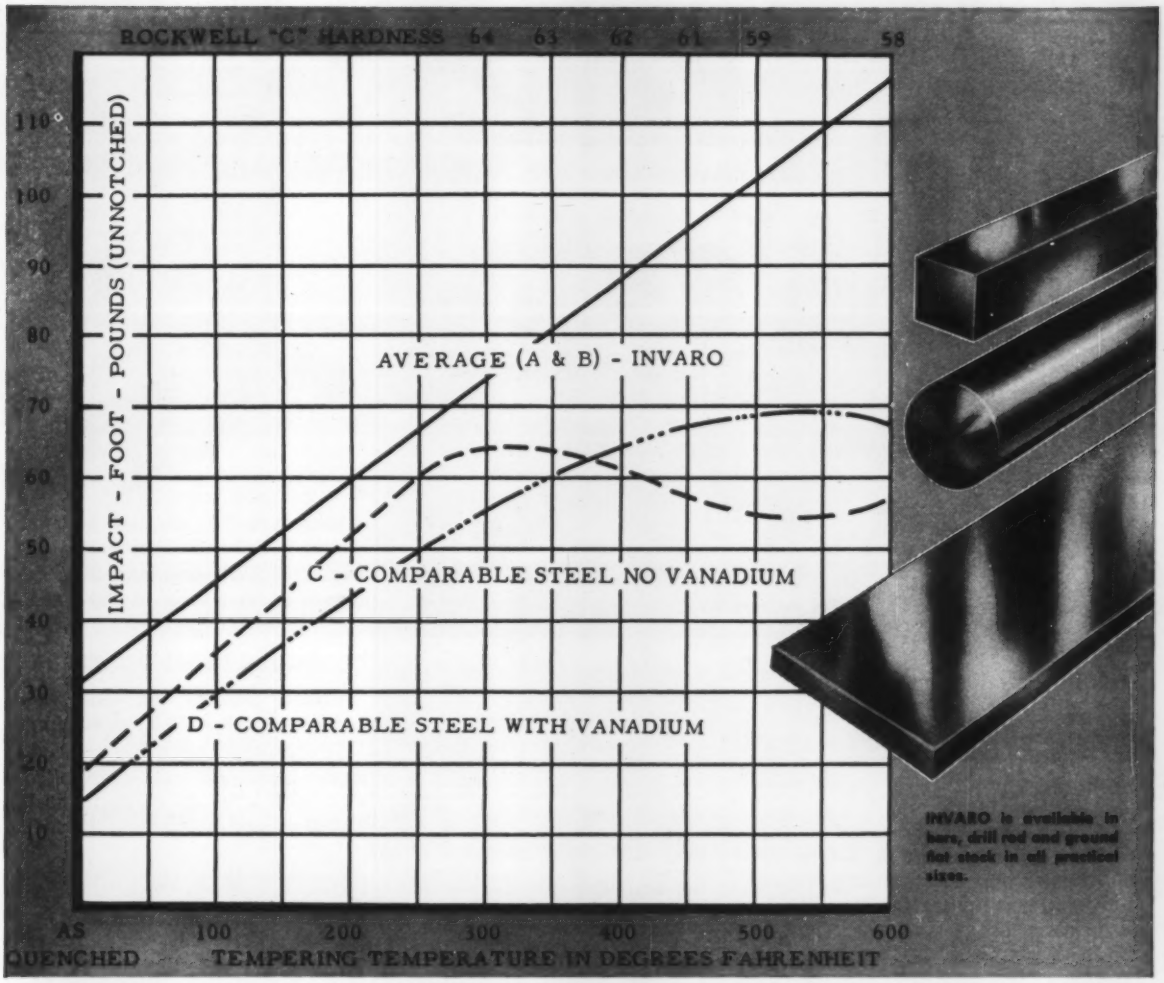
Miller Handles Tough Jobs

This floor-type milling machine cuts the ends of structural steel shapes efficiently and does other cumbersome milling jobs.

The spindle head has up to 60 in. of vertical travel. Horizontal travel of the column ranges up to 120 in.

The 20-hp main drive motor and the multispeed feed motors are controlled by a pendant station.

Spindle speeds: 400, 972 and 1620 rpm. Feeds to the head and



INVARO . . . *IZOD-PROVED* THE TOUGHEST

of leading comparable oil-hardening tool and die steels

When the toughness of a tool and die steel is the critical factor of selection, Firth Sterling INVARO is the *toughest* of the tough! That's not just an opinion but a *fact.* Undeniable proof is established by the A.S.T.M. Izod Impact Test, results of which are graphically shown above, comparing steels both with and without vanadium.

INVARO shows a superior toughness in *all* ranges of temperature from a minimum advantage of about 12% to as much as 100% greater! This marked superiority is the result of Firth Sterling's advanced metallurgical practices combined with 67 years of experience in the art of making specialty steels.

Yes, when you want *toughness* in your tools and dies, combined with uniformity, excellent hardening properties and safety in heat treating . . . specify INVARO.

Chemical Analysis	*All test samples were machined from half-inch annealed bar stock.* C	Si	Mn	S	P	W	V	Cr
Invaro A	.88	.34	1.22	.010	.020	.49	.19	.50
Invaro B	.94	.25	1.20	.014	.013	.53	.22	.49
Comp. C	.90	.33	1.24	.011	.025	.50	—	.55
Comp. D	.95	.34	1.27	.010	.020	.50	.21	.59

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

MILLS: McKEESPORT, TRAFFORD, DETROIT, HOUSTON, HARTFORD

OFFICES AND WAREHOUSES*: BIRMINGHAM CHICAGO* CLEVELAND* DAYTON DETROIT* HARTFORD* HOUSTON* LOS ANGELES* PITTSBURGH WESTFIELD, N.J

R-320

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
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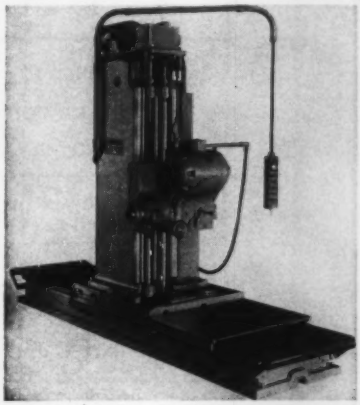
1882 1957 75th ANNIVERSARY

THE DAILY NEWSPAPER OF THE STEEL AND METAL INDUSTRIES. ESTABLISHED 1882

NEW PRODUCTS and equipment

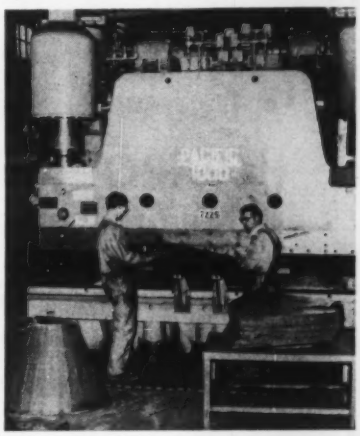


column are 30, 40 and 60 ipm. *Write*: Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, O. *Phone*: Kirby 1-4815

Hydraulic Press Brake

Frame, channel and cone work are done by this 1000-ton machine.

The brake makes acute and right angle bends in soft material or steel with a tensile strength up to 75,000 psi and 1/16 to 1½-in. thick.



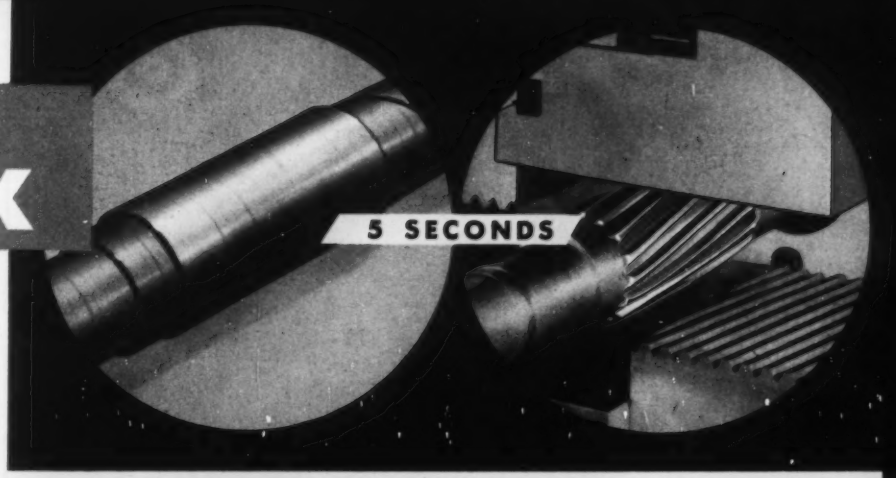
The machine also punches, blanks, and does deep drawing. Deep drawing is made possible by three cushion cylinders in the front and back of the machine. Their combined pressure is 200 tons. *Write*: Pacific Industrial Mfg. Co., 848 49th Ave., Oakland, Calif. *Phone*: Andover 1-8303

Multiple Station Machine

This 25-station machine does 30 operations, including drilling, tapping, boring, automatic assembly

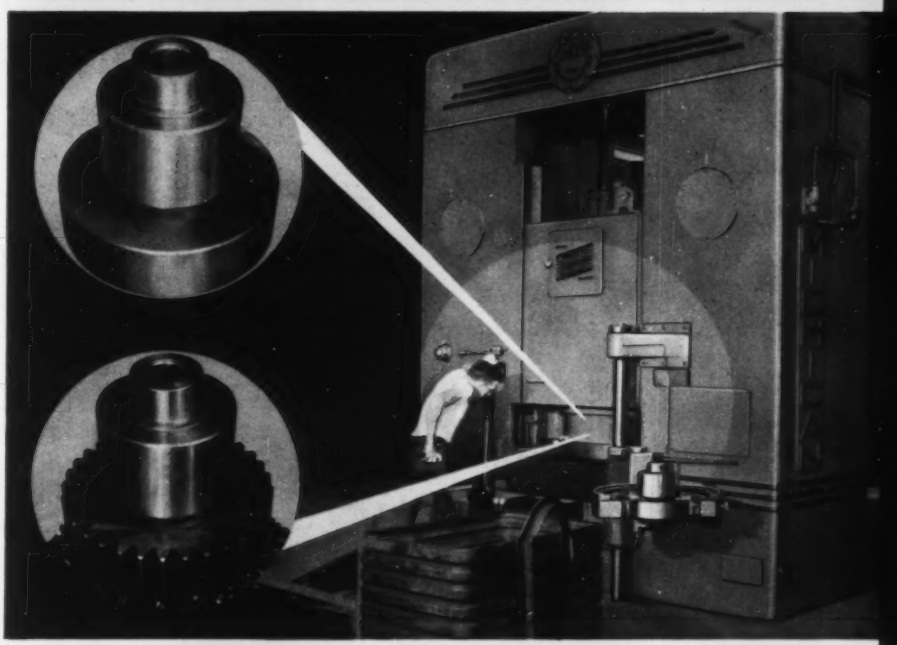
This Month's

GEAR PIX



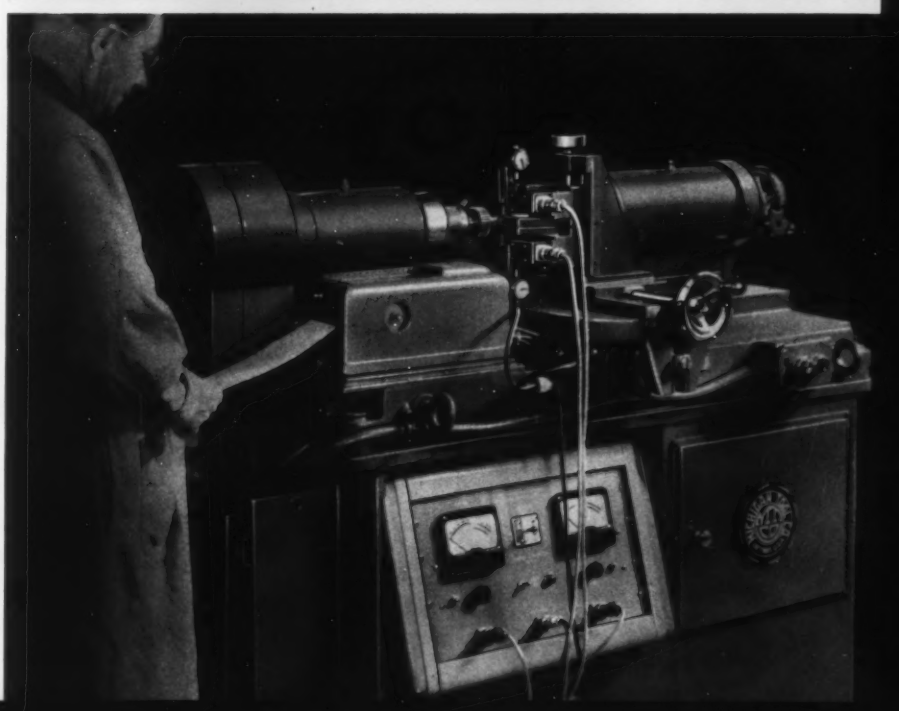
SPLINE ROLLING IN ONLY 5 SECONDS . . .

. . . That's all it takes to roll-form this helical spline with the Michigan Roto-Flo "chipless production" process. Floor-to-floor time, with automatic loading, is 17 seconds. Cold metal displacement produces required dimensions from blank diameters less than the PD and OD. As accurate as machining, the process produces superior surface finishes. Want more data? Just ask for our application Bulletin RF-55.



GEARS FOR ROADBUILDING EQUIPMENT . . .

. . . are readily cut on this automatically cycled Michigan Shear-Speed. The heavy 33-tooth gear shown (3¾-in. face width) is produced at 5½ pieces per hour, removing over 10 lbs. of SAE 8622 steel as chips. Cutting speed is 17 fpm. Let us send you Bulletin SS-55 telling the full story of large gear shaping.



AUTOMATIC CHECKER FOR HIGH PRECISION GEARS . . .

. . . designed particularly for aircraft and special-purpose spur gears. Cuts time needed for checking and recording parallelism, tooth taper and tooth spacing to 16% of normal. Handles gears from ¼ to 2½-inch face width and up to 14 inches diameter. Readings are automatically and permanently recorded by a built-in recorder for easy comparison. Ask for Bulletin 481-A.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.
IN CANADA: COLONIAL TOOL CO., LTD.

This Month's

GEAR PIX

AUTOMATIC LOADING UPS GEAR SHAVING OUTPUT . . .

. . . and releases the operator for preliminary gear checking. Mechanical loaders on standard machine tools (shown here: a Michigan Gear Shaver) offer a middle ground of automation that pays off immediately in output per machine-hour without increasing the work load of the operator. It's also safer.

READY SOON— A TANDEM HOBBER . . .

. . . latest addition to the Michigan line of hobbers features self-contained checker, automatic size control, loading and unloading, and chip disposal. You'll be able to set two or more of these hobbers in series for continuous through-feeding of parts. Literature coming off press soon—drop us a line now.

FROM RESEARCH— BETTER MACHINES, BETTER GEARS . . .

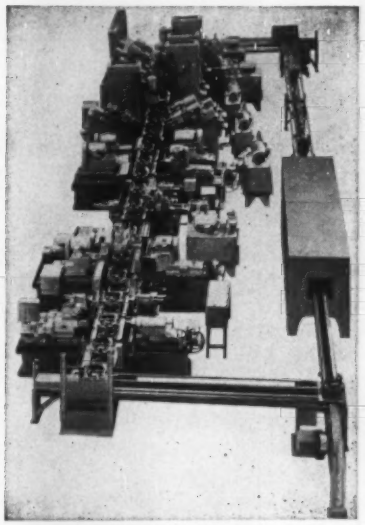
. . . Michigan machines and tools of tomorrow—for the controlled-quality, easier-made gears and splines to come—will owe much to the work of our research staff. This stepped-up development activity, now housed in new facilities (one section of which is shown), will carry on the scientific study basic to gear progress. New methods, machines and tools are sometimes the best answer to requirements of a particular manufacturer. If you have a problem in the area of gear and spline production, we will be glad to talk it over.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.
IN CANADA: COLONIAL TOOL CO., LTD.

of liners, gaging, milling and facing of two different automatic transmission extensions.

Production is 180 pieces an hour. Electrical selectors shift from processing one part to another in seconds.

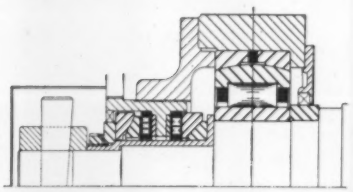


The base is constructed in sections to facilitate part changes. *Write*: Buhr Machine Tool Co., Ann Arbor, Mich. *Phone*: Normandy 2-5646

Bearing for Forming Passes

This double-acting aligning thrust bearing (center) is for severe conditions where potential misalignment and heavy intermittent thrust loads from either direction are present.

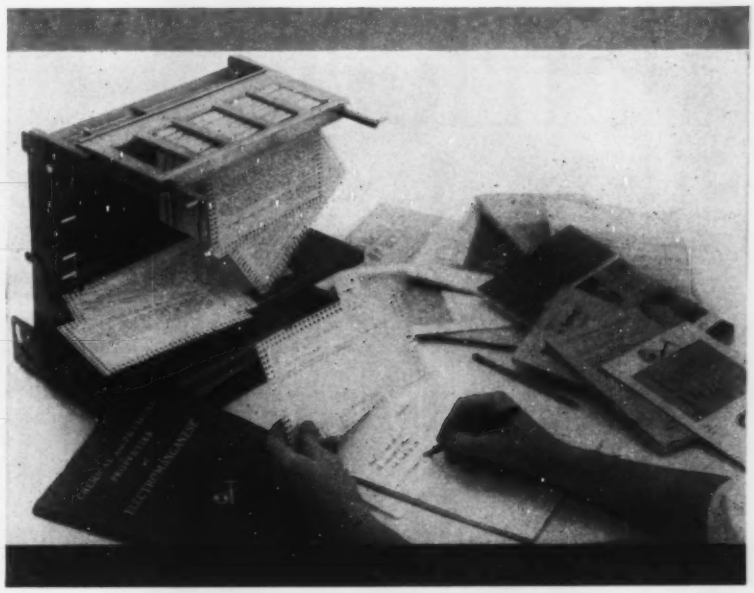
The assembly for steel forming passes consists of two center thrust plates, two roller assemblies, left and right-hand curved thrust plates with curved aligning plates and an inner spacer sleeve.



Rollers (1 in. in diameter) are staggered to insure even wear. Three ½-in. long rollers are used in each of ten slots and two ¾-in. long rollers in ten alternating slots.

Bearing thrust capacity at 100

new . . . booming . . . stainless steels call for alloy help



and ELECTROMANGANESE® has it

New, high-manganese stainless steels are catching on fast. Their lower costs and better mechanical properties are just one reason. Producers and fabricators of the old high-nickel 300 Series alloys, now able to minimize the effects of nickel shortages, are switching to the new 200 Series. Others who have long looked with interest at stainless, but were discouraged by possible shortages, are adding to the growth.

If you are a steel producer, when you pursue the new stainless steels you'll need more manganese. You'll call for the purest manganese made . . . electrolytic manganese . . . because it's the cheapest way to get the necessary manganese content without harmful impurities.

The Electromanganese Division of the Foote Mineral Company is ready to help you get started. Since its development of 99.98% pure manganese on a commercial basis some 17 years ago, when people said it couldn't be done, it has built its reputation upon service. A letter from you will bring the technical knowledge resulting from this experience to your desk through a Foote engineer. Or, if you'd prefer more information first, you'll receive it promptly by writing our Technical Literature Department, Foote Mineral Company, 411 Eighteen West Chelten Building, Philadelphia 44, Pa.

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SALES OFFICE: *Electromanganese Division, Knoxville, Tennessee*
RESEARCH LABORATORIES: *Berwyn, Pennsylvania*
PLANTS: *Cold River, N. H.; Exton, Pa.; Kings Mountain, N. C.; Knoxville, Tenn.; Sunbright, Va.*

ELECTROLYTIC MANGANESE METAL • WELDING GRADE FERRO ALLOYS • STEEL ADDITIVES • COMMERCIAL MINERALS AND OXIDES • ZIRCONIUM & TITANIUM (IODIDE PROCESS) • LITHIUM METAL CHEMICALS AND MINERALS • STRONTIUM CHEMICALS

Fairless Works

uses

RESEARCH-COTTRELL PRECIPITATORS

for these gas cleaning jobs

Eleven Research-Cottrell Precipitators, handling 927,160 cubic feet of gas per minute with collection efficiencies of 95% and over, are installed or are being installed at U. S. Steel Corporation's Fairless Works.

Precipitators for blast furnaces and detarring are old, familiar applications for Research-Cottrell. At the end of 1955, 162 blast furnace and 464 detarring precipitators had been installed by Research-Cottrell, including these recent installations at the Fairless Works.

Scarfing and sintering machine applications are fairly recent developments, however. At present Research-Cottrell has installed two scarfing machine precipitators. Five iron ore sintering machine precipitators are in operation, and one more is under construction.

Research-Cottrell has also developed and installed precipitators for electric furnaces, ferromanganese blast furnaces and iron cupolas. For more information on any of these "steel industry" applications contact your nearest Research-Cottrell representative—or write for Bulletin GB.

Research-Cottrell, Inc.

Main Office and Plant: Bound Brook, N. J.
405 Lexington Ave., New York 17, N.Y. • Grant Building, Pittsburgh 19, Pa.
228 N. La Salle St., Chicago 1, Ill. • 111 Sutter Bldg., San Francisco 4, Cal.

Scarfing Machines

Two precipitators clean scarfing machine gases (95,000 cfm) from a slabbing mill and blooming mill. Collection efficiency is 95%.

Blast Furnace

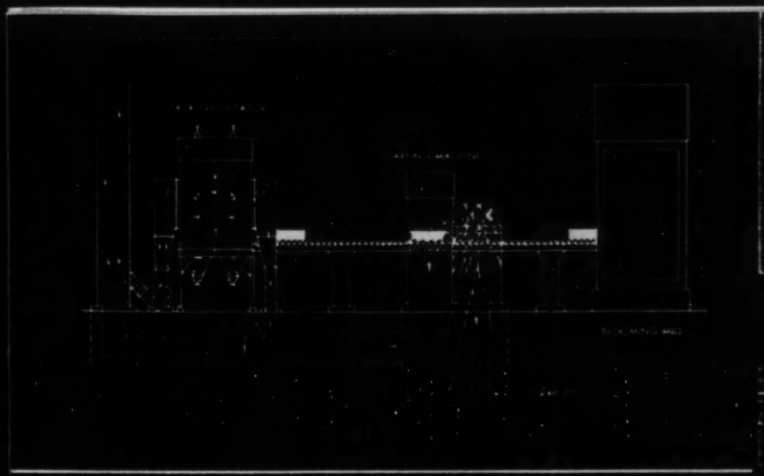
Four precipitators clean gas (330,000 cfm) from two blast furnaces. Efficiency is 95%.

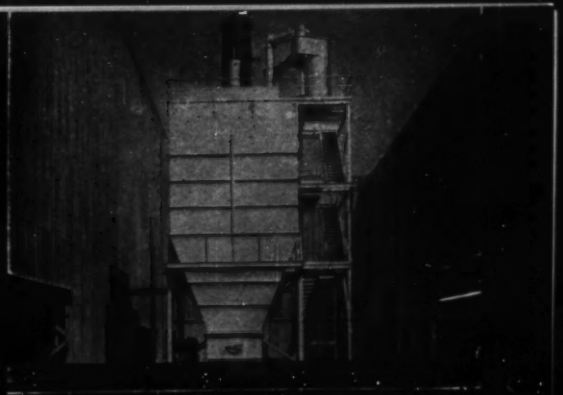
Detarring

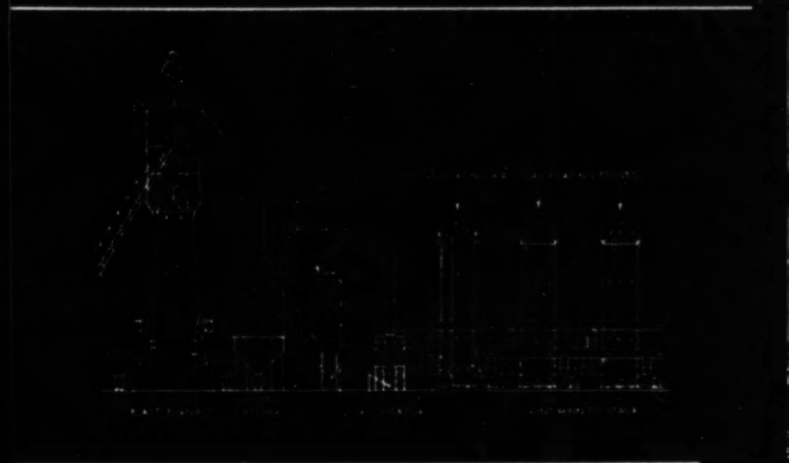
Four precipitators clean coke oven gas (62,160 cfm). Collection efficiency is 95%.

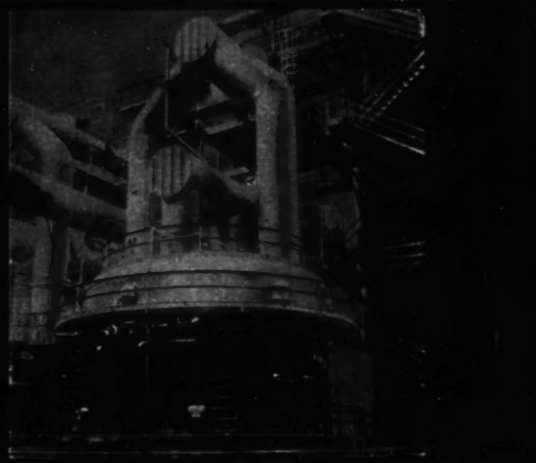
Sintering Machines

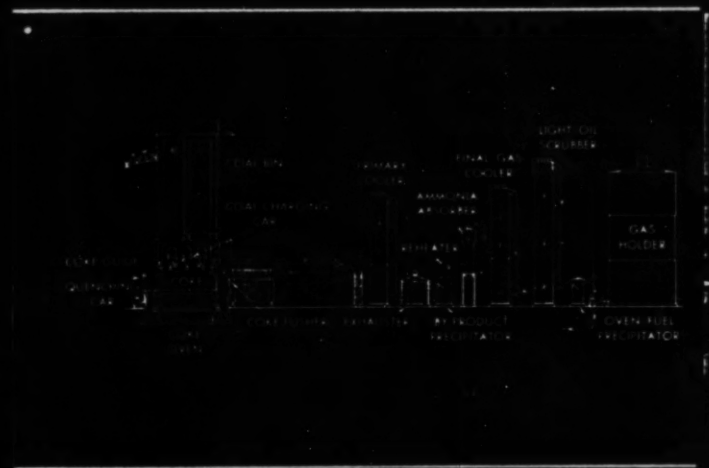
One precipitator (see cut-away drawing at right) will clean 440,000 cfm of gas from iron ore sintering machine. Collection efficiency of 95% is guaranteed.

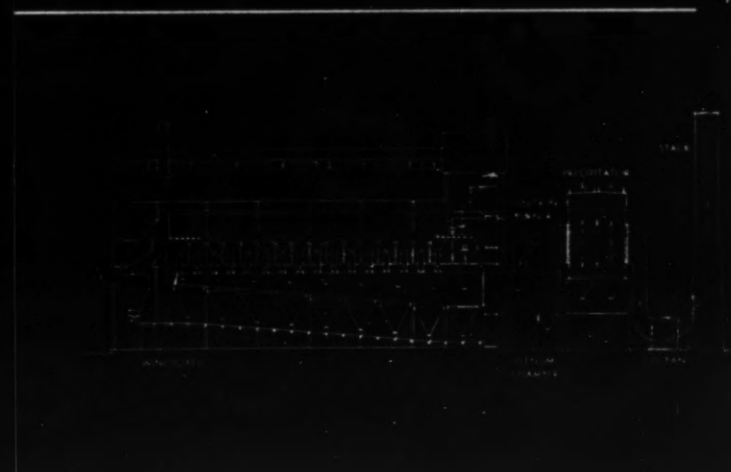


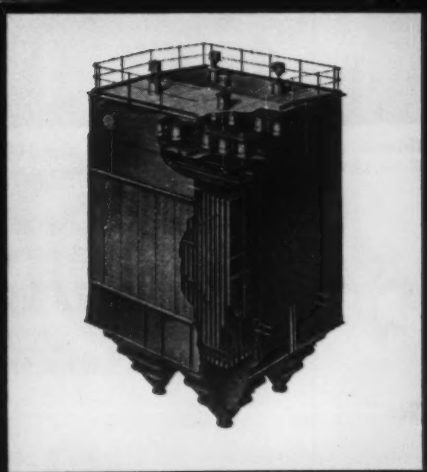


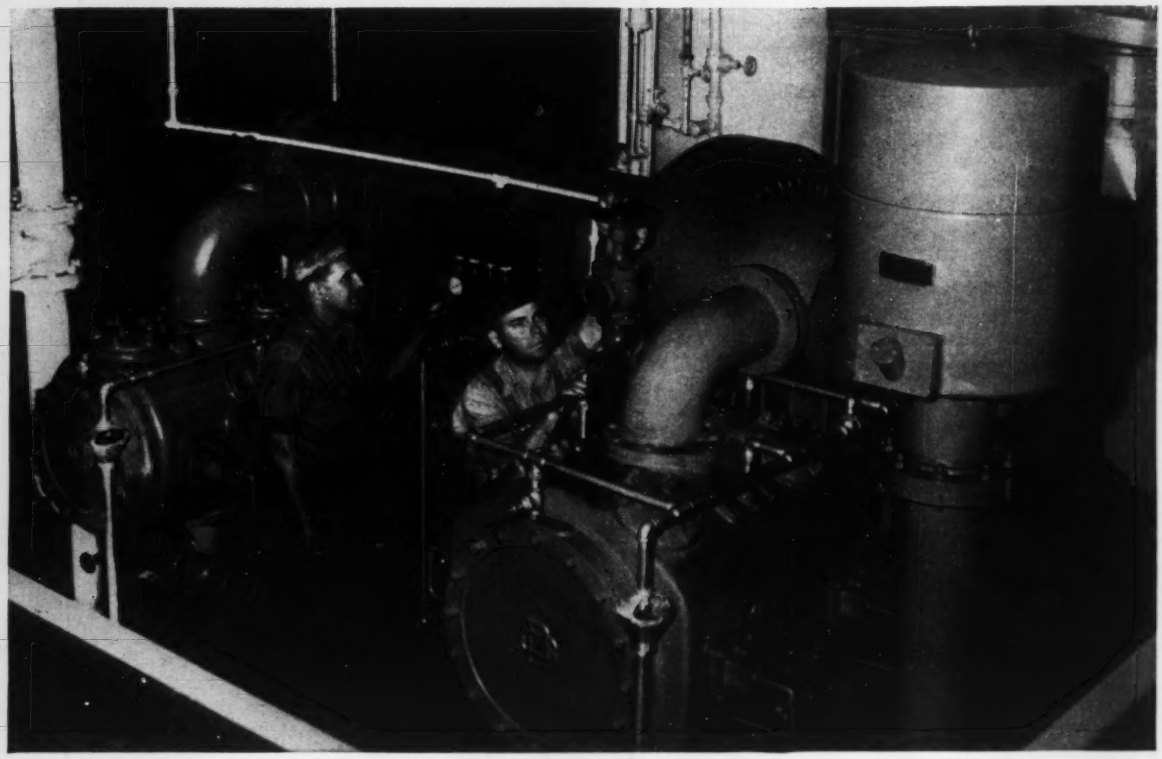










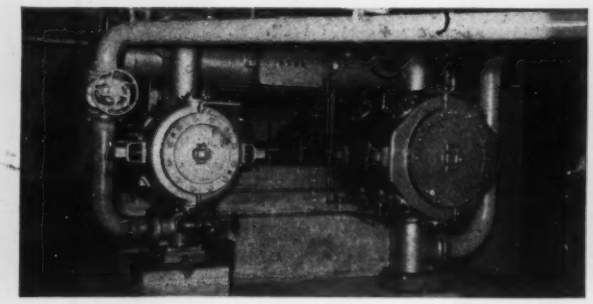


18 & 11 x 12 HAE compressor supplies 'round-the-clock air power in an aircraft plant.

"WE WANT 'ROUND-THE-CLOCK AIR POWER— Gardner-Denver compressors give it to us"

Here's why they picked this Gardner-Denver heavy-duty, full-load compressor for continuous service:

- Completely enclosed main frame with removable, bolted cover plates . . . working parts easy to reach for inspection and adjustment.
- Gasketed covers keep oil in . . . dirt out.
- Two crankshaft counterweights for better balance . . . greater efficiency . . . longer service life.
- Factory-trained staff for technical and engineering service from convenient branch offices.



Midwest metalworking plant relies on this HAE compressor for air power. Ask for Bulletin HAC-36.

9 x 9 RX compressor delivers air to container plant. Ask for Bulletin HAC-40.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

rpm is 114,275 lb. Capacity, size and design may be modified to specifications. *Write*: Rollway Bearing Co., 541 Seymour St., Syracuse, N. Y. *Phone*: 75-2121

Cadmium Plating

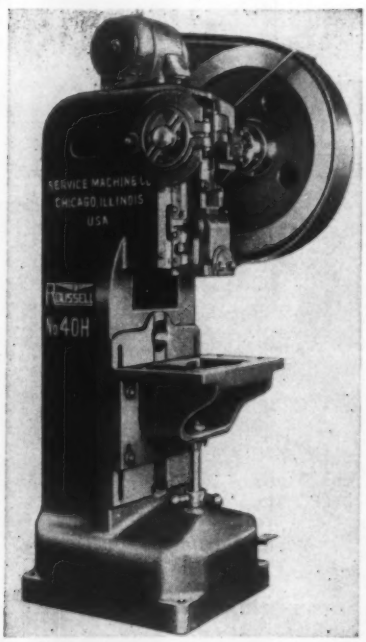
The Cadalume process produces bright deposits with low brightener consumption in a short time.

The coating protects iron and steel parts against corrosion—nonferrous metals against surface tarnish, corrosion or galvanic couples formed in assemblies.

Unlined steel tanks can be used. The bath is a clear solution. *Write*: Hanson-Van Winkle-Munning Co., Church St., Matawan, N. J. *Phone*: Matawan 1-1000

Horn Press Is Versatile

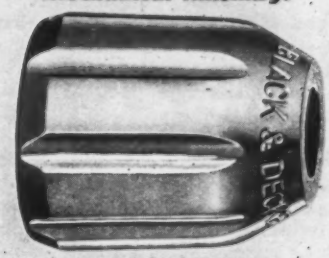
Forming, punching and riveting of hollow, odd shaped and cylindrical work are done by the 40-H press. It has an adjustable bed table to accommodate dies and fixtures requiring a large space between the bed and the slide. Turning a handscrew adjusts the die space.



Press capacity range is 5 to 40 tons. *Write*: Service Machine Co., 2310 W. 78th St., Chicago 20, Ill. *Phone*: Prospect 8-1200

now you can get this brilliant finish directly on zinc die castings!

No electroplating--no mechanical finishing!



TREATED WITH NEW IRIDITE

NEW IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

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NEW literature

Write directly to the company for a copy

Turk's-Heads

Bulletin TH56, 12 pages, contains basic technical information on turk's-heads, describes their advantages as a precision production machine and explains typical wire shaping applications. Fenn Mfg. Co., Fenn Rd., Newington, Conn.

Hot Forged Chisels

This 16-page bulletin lists pneumatic and hand chisels by point style, body size and shank type. Bedford Tool & Forge Co., Bedford, O

Socket Screws

Socket head cap and setscrews for electronic equipment, industrial and scientific instruments, and other compact products are covered in a 4-page bulletin. Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

Industrial Pumps

Bulletin 1100, 12 pages, describes a line of close-coupled pumps. Layne & Bowler Pump Co., 2943 S. Vail Ave., Los Angeles 22, Calif.

Ceramics

Properties of a line of industrial ceramics and designing information are presented in 20-page bulletin 57. Star Porcelain Co., 34 Muirhead Ave., Trenton 9, N. J.

Industrial Insulation

Specifications and uses of a line of spun mineral wool insulating products are given in this 20-page bulletin. Engineering Department, Baldwin-Hill Co., 500 Breunig Ave., Trenton 2, N. J.

Diesel Engines

A 14-page bulletin discusses 550 to 2400 hp diesel engines. Alco Products Inc., P.O. Box 1065, Schenectady, N. Y.

Grease

N-52X is a stable grease with a high melting point for bearings running at temperatures up to 250° F and sealed antifriction bearings used at normal temperatures. Its useful life is charted in bulletin 47. Sun Oil Co., Philadelphia 3, Pa.

Rust Prevention

This 1957 coating manual, form 256, 32 pages, contains over 100 color chips of primers; coatings for use where dampness, salt air and spray, fumes and abrasion are present; and coatings for normal conditions. Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.

Thread Rolling

An attachment used on automatic screw machines for precision rolling of taper pipe threads is covered in bulletin G-96-2, 14 pages. Landis Machine Co., Waynesboro, Pa.

Grinding and Polishing

This 4-page bulletin describes a machine that uses three coated abrasive belts for polishing, stock removal or combinations of polishing and grinding. Curtis Machine Division, Carborundum Co., Jamestown, N. Y.

Stainless Fasteners

This 12-page bulletin covers aircraft bolts, slotted and Phillips machine screws, flat and round rivets and washers. Allmetal Screw Products Co. Inc., 821 Stewart Ave., Garden City, L. I., N. Y.

Pushbuttons

Oil-tight pushbuttons rated to 550 volts ac or dc, selector switches, pilot lights and accessories are de-

NEW LITERATURE

picted in catalog 5606A, 32 pages. Furnas Electric Co., 1055 W. McKee St., Batavia, Ill.

Fuel Tank Caps and Necks

This 16-page bulletin provides engineering data on caps and filler necks for various fluid tank installations. Department R, Stamping Division, Eaton Mfg. Co., 17877 St. Clair Ave., Cleveland 10, O.

Pallet Handling

This illustrated chart describes the most efficient methods of handling expendable pallets. Signode Steel Strapping Co., 2600 N. Western Ave., Chicago 47, Ill.

Roof Ventilators

Construction, operations and design features of a line of powered propeller-type ventilators are described in bulletin 3904, 8 pages. American Blower Corp., Detroit 32, Mich.

Hexagon Nuts

Basic engineering data and specifications on hexagon nuts and four types of special nuts are given in this 8-page bulletin. National Machine Products Co., 44225 Utica Rd., Utica, Mich.

Die Set Lubrication

A lubrication gun that can be used with oil or grease is described in a 1-page bulletin. Danly Machine Specialties Inc., 2100 S. Laramie Ave., Chicago 50, Ill.

Rubber Paints

Uses of Parlon chlorinated rubber paints for corrosive environments are covered in a 22-page bulletin. Cellulose Products Department, Hercules Powder Co. Inc., Wilmington 99, Del.

Fork Truck

This 4-page bulletin describes an electric powered truck (2000-lb capacity) for use where headroom is low. Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.

Industrial Locomotives

Features of a line of haulage equipment are presented in bulletin GEA-6445, 16 pages. Apparatus Sales, General Electric Co., Schenectady 5, N. Y.

Aircraft Switches

Catalog 78, 32 pages, describes over 140 switches, auxiliary switch actuators and terminal enclosures for airborne equipment. Micro Switch Division, Minneapolis-Honeywell Regulator Co., Freeport, Ill.

Resistance Welding

Bulletin RW-10, 28 pages, presents a line of resistance welding tips, wheels, dies and holders. Ampco Metal Inc., 1745 S. 38th St., Milwaukee 46, Wis.

Drill Stop

Bulletin 18-50, 4 pages, describes a stop with a micrometer depth adjustment for drilling and reaming. Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

T-Slot Bolts

Forged T and T-slot bolts are described in a 4-page bulletin. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, O.

Alloy Steels

Chemical compositions of hardenable alloy steels and their mechanical properties are discussed in a 16-page bulletin. Reader Service Section, International Nickel Co. Inc., 67 Wall St., New York 5, N. Y.

Plating

An additive for chromium plating baths which stops mist and spray regardless of the operating temperature is described in a 5-page bulletin. A zinc process for barrel plating is

FOR CUSTOMIZED CONVEYORS WITH MAY-FRAN STANDARDIZATION

Developed to provide the ultimate of versatility, the May-Fran program of STANDARDIZATION permits users to create and construct their own conveyors to meet individual needs.

It literally provides a type of "super market" shopping for the straight, curved, inclined, take-up and discharge end sections required to meet the specifications of YOUR job requirements. Sections can be furnished to meet belt width as well as load bearing and volume capacities. Conveyors can be changed relative to length or width with only a minimum of downtime.

Write today . . . ask for a copy of MF Bulletin No. 200

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Looking for the world's most complete stock of 52100 steel tubes and bars? You've come to the right spot . . . . . .

PETERSON STEELS, INC.
Union, New Jersey
Detroit, Michigan Chicago, Illinois

NEW LITERATURE

covered in a 12-page bulletin. A high chloride process for bright nickel plating, rack or barrel, is presented in a 4-page bulletin. Udylite Corp., Detroit 11, Mich.

Variable Pitch Drives

Bulletin V-183-A, 12 pages, gives specifications and tables of stock drive combinations. Browning Mfg. Co., Maysville, Ky.

Strain Gages

A guide to the selection of gages and a discussion of the methods of using them are contained in this 16-page bulletin. Department SO 110, Electronics & Instrumentation Division, Baldwin-Lima-Hamilton Corp., Waltham, Mass.

Arc Welding Machines

Specifications for all types of arc welders, from ampere ratings to outside dimensions, are included in catalog ADC 708C, 44 pages. Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Electrical Contacts

Properties, forms and uses of a line of electrical contacts made of silver, palladium and nickel, silver alloys and powdered metals are presented in bulletin C-522, 4 pages. Gibson Electric Co., 8360 Frankstown Ave., Pittsburgh 21, Pa.

Flareless Fittings

Bulletin 4320, 28 pages, depicts fittings suitable for tubing with heavy walls. Tube & Hose Fittings Division, Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, O.

Slitting Lines

This 76-page handbook gives details on multiple rotary slitting lines for coils and sheets. Yoder Co., 5500 Walworth Ave., Cleveland 2, O.

Brass and Bronze Ingots

This 16-page bulletin describes ingots made with an additional refining process. I. Schumann & Co., 4391 Bradley Rd., Cleveland, O.

Pushbuttons

This 26-page bulletin EL-178 presents oil-tight pushbuttons, indicating lights, selector switches, covers, enclosures and accessories. Cutler-Hammer Inc., 320 N. 12th St., Milwaukee, Wis.

Straight Side Presses

Single and double crank presses are described in bulletin 13300, 8 pages. Hamilton Division, Baldwin-Lima-Hamilton Corp., Hamilton, O.

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THIS ad appeared more than 25 years ago—in January, 1932. At that time Corhart Electrocast was still so new in the glass industry that only a few of the most progressive companies dared buy it. It was, *and still is,* "one of the world's highest-priced refractories". Yet now its use is practically universal . . .

Today Corhart 104 is new in the steel industry. Like its glass-industry counterpart, it too is "one of the world's highest-priced refractories". Yet it offers open-hearth furnace operators the same opportunities for greater production and lower costs that Corhart Electrocast brought to the glass industry.

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STEEL

February 18, 1957

Market Outlook

IF you're reducing steel inventories, keep alert for a pickup in demand. A lengthening of deliveries might catch you short.

Such a pickup could happen. Automobile production is higher than it was a year ago, and there are enough orders booked to keep durable goods production at its current record high until mid-June even if no more new orders were received. (And no one expects that.)

CAUSE—Inspiring the reduction of inventories is the freedom from a steelworkers' strike this year. The current three-year labor contract in the steel industry promises labor peace until mid-1959. In many of the past years, consumers built steel inventories in the first half to carry through a strike period. Now they don't need that protection.

KEEP WATCH—When consumers feel they have cut their inventories as far as is practicable, they will come back into the market for at least as much tonnage as they need for current usage. An increase in buying lengthens deliveries, and this prompts almost everyone to step up his buying to protect himself. A buyer who has let his inventories get too low may find himself in an uncomfortable position before the next shipment arrives.

The major steel product in soft demand is cold-rolled carbon sheets. Biggest user of them is the automobile industry. While it built large inventories of steel last year, it can't live forever on them. Strengthened demand from the auto industry would quickly lengthen delivery time on cold-rolled sheets.

REASONABLE—Inventories as a whole in the durable goods industry are not considered to be excessive. Raw material, goods in process and finished goods on hand are equal to only two months' production at current rates—and there are enough orders on the books for four months' output at present high levels.

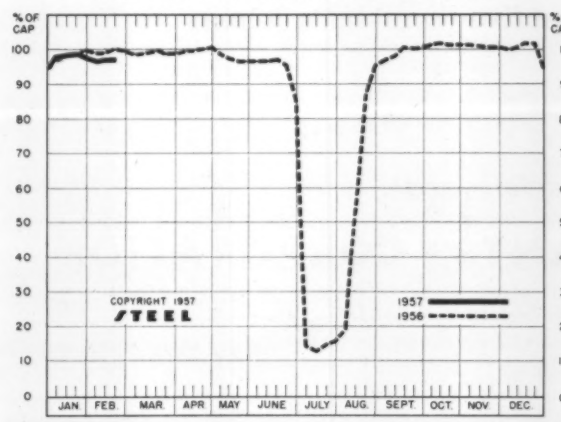
OUTPUT HIGH—Steel ingot production maintained its 97-per-cent-of-capacity rate in the week ended Feb. 17. This pace is at a yearly rate of 129 million tons. No one has expected steel output to be so high this year. A common prediction has been 120 million tons. So a decline in the weekly rate in the second quarter, or even in March, would not be unexpected. A 120-million-ton year would mean a 90-per-cent average. This could be attained through a 95-per-cent average in the first half and an 85-per-cent average in the second half.

Steel ingot production wouldn't have to go as high as 120 million tons to be as good as any year we've ever had. The record is the 117 million tons produced in 1955.

STEEL GOES UP—Steel prices continue to go upward, principally in the form of increases in price extras. Raised were carbon hot-rolled bars, reinforcing bars, tube rounds, skelp, rerolling and forging semifinished steel, rods, wire, alloy products and tubular goods. Overall effect is an increase of a little less than 4 per cent.

SCRAP GOES DOWN—A decline in prices of scrap (a raw material for the steel plants) continues. In the week ended Feb. 13, STEEL's price composite on steelmaking scrap slipped to $53.17 a gross ton, a $2 reduction.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Feb. 17	Change	Same Week 1956	Same Week 1955
Pittsburgh	98	— 1	102.5	88.5
Chicago	96.5	+ 0.5*	99	91.5
Mid-Atlantic	98.5	+ 0.5	101	86
Youngstown	100	— 2	100	90
Wheeling	100	— 0.5	100.5	94
Cleveland	95.5	— 2.5*	105	92.5
Buffalo	107.5	0	105	100
Birmingham	95.5	+ 1	96.5	85.5
New England	68	— 6	73	88
Cincinnati	86	— 1*	94.5	88
St. Louis	91	— 8.5	104.5	102.5
Detroit	101.5	0	103	88
Western	103	0	106	88
National Rate	97	0	100	88.5

INGOT PRODUCTION‡

	Week Ended Feb. 17	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	153.7†	154.7	153.6	151.5
NET TONS (In thousands)	2,469	2,485	2,467	2,433

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—p. 101 Technical Outlook—p. 149

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Babcock & Wilcox Co.

Shipments Head Up

	TONS
*1957	408,715
*1956	389,925
1955	276,215
1954	277,210
1953	441,125
1952	418,076
1951	332,115
1950	249,083

*Estimated.

Pressure Tubing Use Grows

SEAMLESS pressure tubing will continue among the hard-to-get steel products throughout 1957 unless more tube rounds are made available. If they aren't, producers are skeptical about their ability to increase net shipments more than 5 per cent over 1956's.

Demand from all consuming industries is booming, notably for power plant expansion and maintenance. If it weren't for heavier production of electricweld tubes, producers would have trouble turning out the tonnage estimated for this year (see table above).

Narrowing Gap—Seamless pressure tubing production is about three times greater than electricweld production. But recent changes in the ASME boiler code permits use of electricweld at pressures in excess of 2000 lb in some applications. With the supply of electricweld relatively freer, this production ratio may narrow. Carbon tubing sales are approximately 5 to 1 over alloy tubing and 16 to 1 over stainless. Again, this margin may narrow as research in alloys for nuclear power installations develops. This will be noted more in dollar shipments than in tonnage, however.

There are five producers of seamless and ten major electricweld plants, although about 45 others produce some form of welded tubing. Distribution through warehouses is relatively high, accounting for about 30 per cent of carbon tubing and 16 per cent of alloy tubing. Some tonnage goes to redrawers, but nearly 70 per cent of production is for original installations and direct buying for maintenance.

Filling Gap — When railroads dieselized, boiler tube producers lost about half their market. In 1940, there were about 40,000 steam locomotives using 8 to 13 tons of tubes per unit. The retubing needs of these locomotives—once every three years—was also a considerable market. But electric power plant expansion and the trend toward larger boilers have overcome this deficit. Utility boilers using 1000 tons of tubing each are not unusual. Power plant boiler life is practically indefinite, says B. R. Mueller, manager of tubular specialties sales for Pittsburgh Steel Co., Pittsburgh. So there is no replacement market there, except in cases of obsolescence. Increased demand from oil refiners and chemical producers has also helped fill the gap.

Design of steam generating equipment persistently demands higher pressures and temperatures. This is fostering intensive research on the question of which new alloys to use, says E. A. Livingstone, vice president of Babcock & Wilcox Co. "Factors of corrosion, creep and stress rupture must be evaluated when designing a high pressure steam generating installation so that it will give long trouble-free service," he explains. This trend already has resulted in slightly greater demand for stainless tubes, compared with carbon, states W. P. E. Ainsworth, vice president, Combustion Engineering Inc., New York. "And this trend is expected to continue," he adds.

Nuclear Impact—While nuclear power plants already are accounting for some of the increased use of stainless pressure tubing, it will be several years before this will be a major factor in tonnage, states Mr. Mueller. "Erection of fuel-fired steam plants will increase until about 1970 to 1975 and then

slowly drop. Nuclear installations will rise from 1965 until they equal fuel-fired plants — about 1977 — and will increase from that point on. By that time we will know more about the actual requirements of tubular products in a nuclear power unit." B&W's Mr. Livingstone adds: "It is no doubt possible that many new alloys, some of which will be of nonferrous composition, will be developed. Presently zirconium and its alloys seem to be the most promising. This is one the problems to solve in 1957 and years to come."

Another problem posed by the specification of higher pressures, according to Mr. Livingstone, is the possible use of smaller tubing to withstand the higher stresses. "This may cause radical changes in methods of tubing manufacture," he says.

Definition — The term boiler tubes in now used in a broad sense, including tubes used in the boiler proper, plus the superheater, preheater, water wall, economizer, flues and other products used in steam generating equipment. Backlogs for these tubes are in most cases at record levels and still growing, assuring heavy future production. There is a lag of two years or longer between booking of major contracts and completion. The tight supply of seamless tubing is matched by shortages of boiler plate and wide-flanged structurals. Worthy of note is that contracts are being booked at higher prices for better profit margins. Lower-priced work booked in 1955 and earlier is now nearing completion.

Aside from these problems, Mr. Livingstone sums up the viewpoint of the industry when he says: "The outlook for 1957 and 1958 represents a fairly clear road ahead for the tubing manufacturers."

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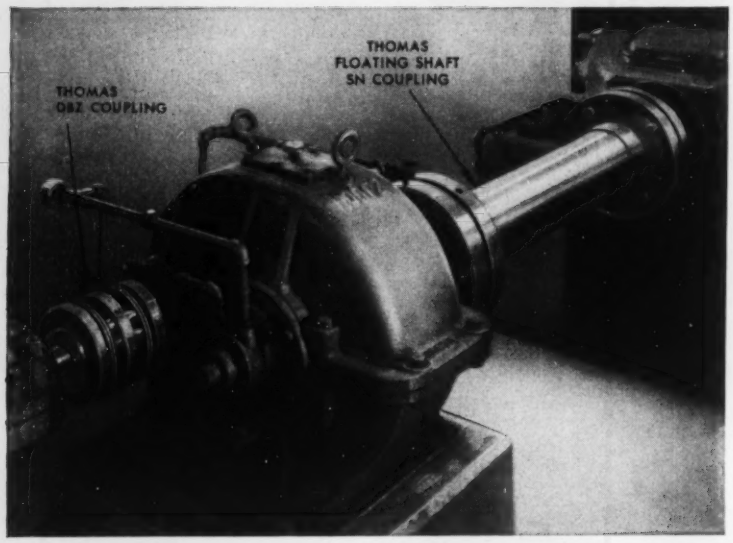

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WARREN, PENNSYLVANIA, U.S.A.

Tubular Goods . . .

Tubular Goods Prices, Page 241

National Tube Division, U.S. Steel Corp., Pittsburgh, increased prices on seamless standard and line pipe, 2 to 12 in.; all sizes of buttweld pipe; oil country casing; tubing and drill pipe; and carbon seamless mechanical and pressure tubing. Effective date is Feb. 9.

The over-all effect of the revisions in discounts is an estimated increase of about 3.5 per cent in prices on the products involved.

Second quarter mill order books for oil country goods are filling rapidly. Seamless tubing and line pipe are sold out for many months ahead. Some weakness is noted in butt weld demand. Second quarter order books for that item are filling slower than usual.

Increasing foreign offerings are reported on the West Coast. Tube mills are accepting orders for April in the area, but they are cautioning buyers that shortages in some specifications may result in extended deliveries.

Cast iron pipe sales agencies expect a brisk spring demand. Recently, the U.S. Pipe & Foundry Co. booked 67 tons for Edmonds, Wash., and Grants Pass, Oreg.

The Spang-Chalfant Division, National Supply Co., Pittsburgh, raised prices on continuous weld pipe, ½ to 4 in.; seamless pipe, 2 to 12 in.; and lapweld pipe. The increases are in line with those an-

nounced by U.S. Steel Corp.

Youngstown Sheet & Tube Co. also similarly raised prices on seamless oil country tubular goods and standard and line pipe, buttweld and seamless, effective Feb. 12.

Increases ranged from $4.50 to $6.50 a ton on certain black and galvanized buttweld line pipe; $6.-50 on black and galvanized seamless standard pipe; $9 on some grades of seamless and electric-weld pipe, 12¾-in. OD and thin wall thicknesses, and $6.50 on thicker wall seamless and electric-weld pipe; $6 to $8 on seamless drill tubing, seamless drill pipe and seamless casing.

U.S. Steel Increases Extras

U.S. Steel Corp. and its operating divisions, American Steel & Wire, Columbia-Geneva Steel, and Tennessee Coal & Iron, announced revisions in extras Feb. 8 covering: Carbon hot-rolled bars, concrete reinforcing bars, tube rounds, skelp, rerolling and forging semi-finished steel, rods, wire, and alloy products.

The changes are similar to those announced over the last couple weeks by various other steelmakers.

Size extras are revised upward and various chemistry, grade and quality extras are adjusted on certain products. Included in chemistry price changes are revisions of carbon-manganese extras applicable to certain carbon products, and revisions of manganese and manganese-chrome extras applicable to alloy products.

Other adjustments include revision in certain instances of extras for treatment, length, quantity, cutting, special straightness and bundling.

The over-all effect of the revisions, certain of which also apply to the high-strength low-alloy steels, is estimated to be less than 4 per cent on the products involved.

National Tube Division also announced upward adjustments in its prices for seamless standard and line pipe, 2 to 12-in; for all sizes of buttweld pipe; for oil country casing, tubing and drill pipe; and carbon seamless mechanical and pressure tubing.

All of the U.S. Steel changes became effective Feb. 9.

Plates . . .

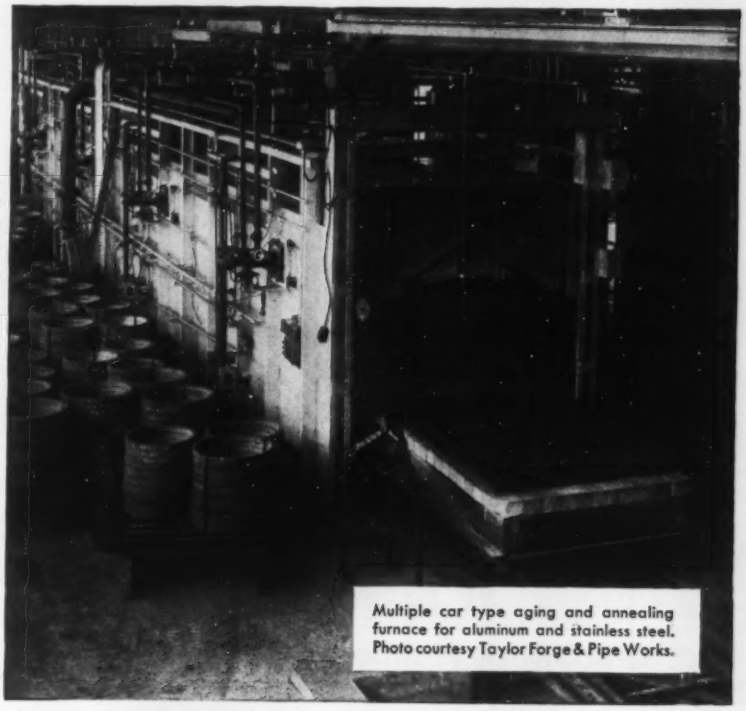
Plate Prices, Page 237

Consumers continue to scratch for heavy gage plates. Some easing in supplies of light gage plates is noted. Increasing tonnage is coming from strip mills because of the slower demand for sheets. But production still is not fully meeting demand.

In the heavier gages, the stringency appears as great as ever. The shipyards are clamoring for tonnage, so are line pipe fabricators, heavy tank manufacturers, freight car builders and mill equipment interests. No one seems to have sufficient tonnage, with warehouse stocks at a minimum and odd lots commanding premium prices.

The plate mills are assured far more tonnage than they can handle in the second quarter.

Plate fabricators are figuring on a municipal water supply line at Salem, Oreg., involving about 7000



Multiple car type aging and annealing furnace for aluminum and stainless steel. Photo courtesy Taylor Forge & Pipe Works.

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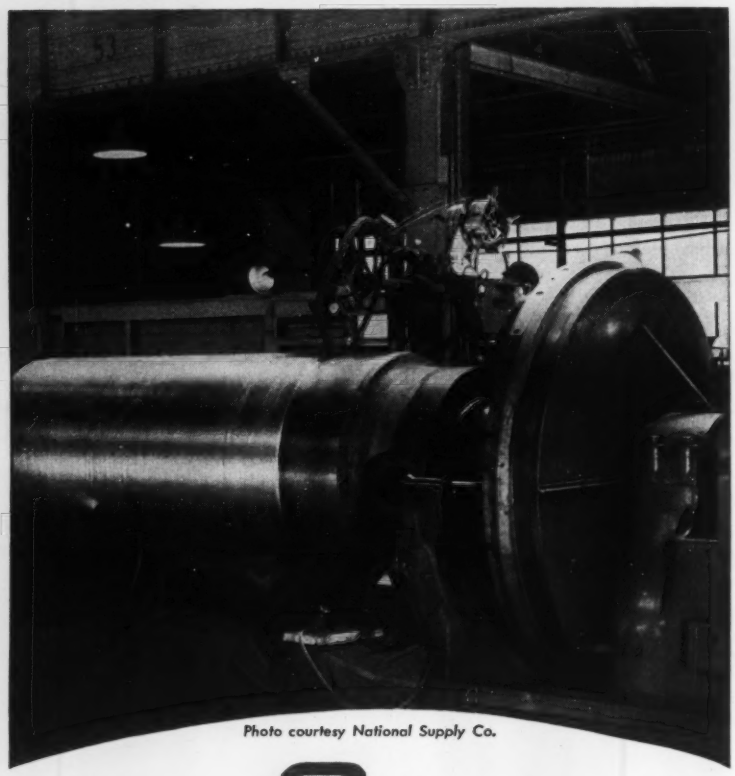
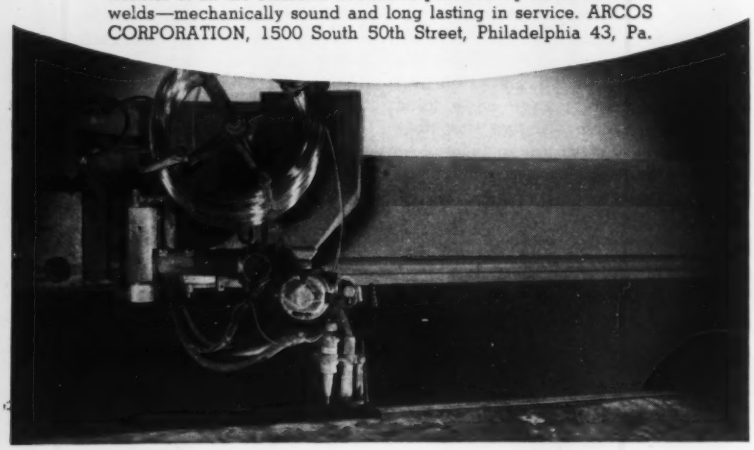


Photo courtesy National Supply Co.

WELD WITH ARCOS

CHROMAR Stainless COILED WIRE

Shown above is a 72,000 lb. Extrusion Ram being overlaid by submerged arc with type 316 stainless weld metal. At the conclusion of the job the entire extensive welded surface was reported sound and crack-free—the same results you can expect with Arcos Chromar Wire on your own jobs. Arcos control of the composition of its Chromar *welding quality* spooled wire assures a transfer of all the elements needed to produce top notch stainless welds—mechanically sound and long lasting in service. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



tons. Bids will be taken Feb. 21.

Small tank builders in New England are getting more light plates, 60 in. and under, to meet rising operating schedules. There is a spurt in small tank orders for gasoline stations which are adding storage for new grades of gasoline.

Stainless Steel Output Climbs

Stainless steel production hit 1,210,569 net tons, an all-time high for the industry. This is an increase of 19,392 net tons over the 1955 mark of 1,191,177.

These figures, released by the Committee of Stainless Steel Producers, American Iron & Steel Institute, were reported by 22 companies representing about 98 per cent of the total output of stainless steel ingots.

Last year also saw the biggest fourth quarter in history, with 360,823 net tons being produced during this period, a 13.5 per cent gain over the comparable quarter in 1955.

Chromium - nickel types accounted for 61.2 per cent of total production in 1956. Compared with 1955 output, new low-nickel stainless steels increased tenfold, chromium nickel types 304 and 316 gained more than 23 per cent.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 238-239

Second quarter sheet orders, particularly for hot and cold rolled, are coming to the mills slowly. With a touch of irony, one eastern seller remarked last week that second quarter specifications are being bolstered by first quarter deferments, principally from jobbers.

Over-all, more tonnage is being offered than is being taken — including hot and cold-rolled sheets, galvanized and certain specialties. Fabrication in the first half of this year may not average as high as it did a year ago. Consumers' inventories definitely will not.

Buyers are less concerned about availability, with no threat of a general steel strike this summer. They are likely to maintain stocks at a more normal level than in recent years.

With prompt shipments available, users can cut inventories without great danger of being caught short. This is particularly true of

automotive consumers who are now eliminating outside warehousing facilities that had become more or less a normal adjunct in recent years. It costs about $1 a ton to unload steel into storage, $1 a month storage fee and $1 for removal.

While demand is sluggish (appliance makers and auto buyers are reportedly setting back second quarter deliveries), conditions could change quickly. Should any spurt in buying on automotive and appliance account develop, it would quickly spread to other lines of consumption. Actually, considerable tonnage is being consumed now, and while demand is not pressing mill capacity, the outlook is for heavy consumption through the second quarter. A mild pickup in buying of straight chromium, 430 grade, stainless strip is noted in New England.

Steel Bars . . .

Bar Prices, Page 237

In the Chicago district, bar rolling cycles are running about six weeks—sometimes being stretched to seven. The current cycle is well filled.

Revised extras for cold finished carbon and alloy bars are being put into effect. Youngstown Sheet & Tube Co., Youngstown, and Republic Steel Corp., Cleveland, posted increases effective Feb. 12 and Feb. 8. Other producers are expected to take similar action.

Extras for size and chemistry are increased in both the carbon and alloy cold-finished grades. Quality extras applicable to the carbon grade only are advanced.

These revisions follow action by the steel mills in raising extras for nickel, molybdenum, and vanadium taken in January. Extras on hot-rolled bars and reinforcing bars were raised Feb. 9 by U.S. Steel Corp. divisions. Changes in its lists followed those announced recently by other producers.

Some sizes of hot-rolled carbon bars are still available for late March delivery, and most bar mills have tonnage for April shipment. There has been no rush of consumers to specify requirements beyond the end of this quarter, except heavy flats and large rounds. Most users are buying only for needs. Some jobbers are cutting

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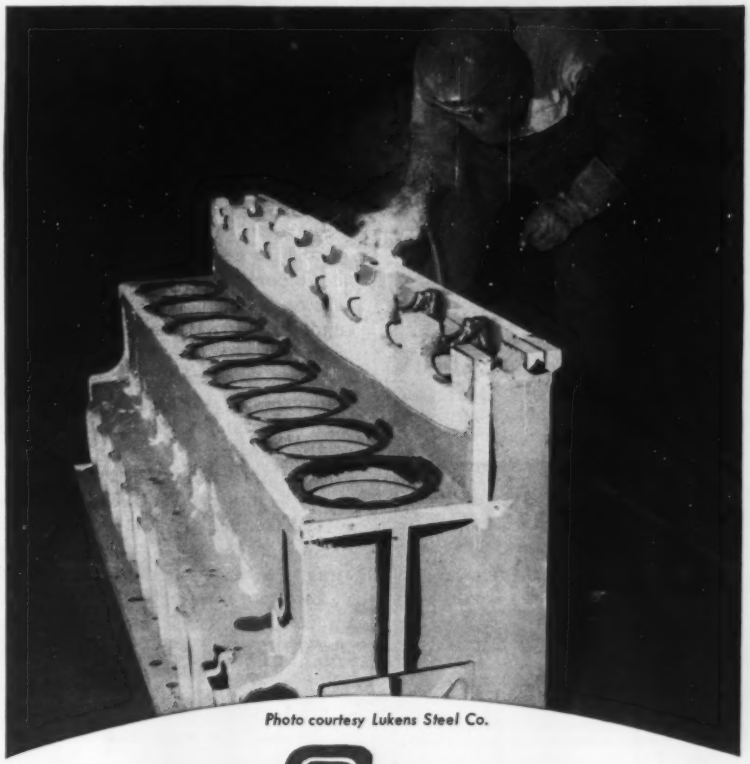
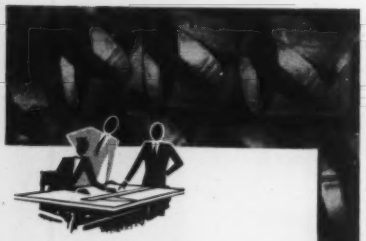


Photo courtesy Lukens Steel Co.

WELD WITH ARCOS

STAINLESS ELECTRODES

This Diesel engine housing—for use on a mine sweeper—is a new application for welded *stainless*. 18-8 stainless was selected for its non-magnetic properties. The unit, and many others, were completely welded with Arcos E308HC-15 low magnetic permeability coated electrodes. Why Arcos? For a reason you'll want to keep in mind: When base metal properties are critical . . . and performance requirements exacting, Arcos quality assures sound weld metal for lasting security. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



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back on their commitments and some hot-rolled tonnage is being held up by cold finishers who appear overstocked on some sizes.

The lag in hot-rolled alloy bars continues, with deliveries available in four to five weeks, plus an additional one to three weeks if furnace treated.

Stainless Steel . . .

Stainless Steel Prices, Page 241

Sharon Steel Corp. formally opened its new $14-million slabbing and blooming mill at the Roemer Works, Sharon, Pa., on Feb. 8. Ingot rolling at the works is increased to 1,200,000 tons annually, and the new facility enables the company to process stainless and high alloy steels for the first time at this works.

With increased electric furnace capacity planned for 1957, Sharon's total ingot capacity is expected to exceed 2 million tons by year's end. Ingots weighing from 4 to 20 tons can now be rolled into slabs up to 10 in. thick by 60 in. wide by 30 ft long.

Tool Steel . . .

Tool Steel Prices, Page 241

Shipments of high speed and tool steel (exculding hollow drill steel) were 8672 net tons in December, reports the American Iron & Steel Institute. This compares with 9889 tons in November, and 10,777 tons in December, 1955.

Total shipments last year (1956) were 125,866 net tons, an increase compared with the 114,529 tons moved in 1955.

Wire . . .

Wire Prices, Pages 239 & 240

Except for a slight seasonal improvement in demand for merchant products and mesh, wire buying for the second quarter is slow, with March openings reported in manufacturers wire schedules.

Automotive volume continues spotty, while consumers of heading wire, makers of screws and other accessories, appear to be relying on their inventories. The same holds with respect to spring wire.

Wire rods are slow, with supply reportedly in excess of demand this quarter.

The ability of producers to make prompt shipments on most grades of carbon wire for industrial goods is a deterrent to forward buying.

Effective Feb. 9, American Steel & Wire Division, U.S. Steel Corp., raised extras on rods and wire. Similar action was taken Feb. 12 by Youngstown Sheet & Tube Co.

Extras for chemistry, quality, thermal treatment and miscellaneous features are raised on these products: Hot-rolled wire rods, manufacturers drawn wire and special purpose wire.

Tin Plate . . .

Tin Plate Prices, Page 239

Tin plate is one light flat-rolled steel product that shows no signs of slackening demand. Volume is expected to support capacity operations for months. Easing in requirements for cold-rolled sheets for the automotive and appliance industries will release more steel to the tin mills.

Structural Shapes . . .

Structural Shape Prices, Page 237

Structural fabricators' backlogs will probably increase over the next few months. Current buying is moderately active, and considerable inquiry is accumulating, siderable inquiry is accumulating.

Bridge and road work is particularly promising, with sizable jobs either on the point of being placed or about to come out. Bridge contracts in New England involve approximately 10,000 tons. Much institutional work is going ahead, and there is a fair volume of office building construction in the planning stage.

The larger fabricating shops are reported booked ahead 12 to 13 months on an average; smaller shops are quoting six to seven months, in some cases less. West coast fabricators' backlogs would be considerably larger were steel supplies sufficient to permit wide bidding.

To the extent deliveries and allotments of standard structurals are nearer to fabricating schedules, plain material supply prospects are improving, but the additional tonnage being made available is still small. Shops continue to press for wide flange material.

A Chicago district steelmaker has just advised customers that

plate and structural steel quotas for the second quarter will be pretty much the same as they were for the first. The quota system used minimizes carry-overs and keeps shipments current. This producer anticipates no change in demand for these products in the foreseeable future.

Warehouse . . .

Warehouse Prices, Page 242

Warehouse order volume is fair, but business varies from district to district. Sales at Chicago are holding up, with February tonnage a little better than December-January average. Philadelphia area sellers expect February tonnage to top that of January on a daily basis.

Contrasting with reports from those points, a Pittsburgh distributor says February sales are off about 10 per cent from the January level. Buffalo warehouses find it necessary to exert more selling effort to move tonnage. The same is true at Cleveland.

Distributors appear to be receiving more tonnage from the mills (notably sheets and bars) than they need for current requirements. As a result, some are deferring shipments. They can't get enough plates and shapes.

Pig Iron . . .

Pig Iron Prices, Page 242

Demand for pig iron is spotty. Inquiry for basic is strong, with steel foundries and nonintegrated steel mills pressing for tonnage.

Foundry grades are moving only moderately well. Casters serving the automotive industry are active, but those making building products and general lines are maintaining only fair operations. A slight pickup is noted at farm implement foundries.

Malleable grades are in somewhat less demand.

U.S. Steel Corp. blew out its Gary (Ind.) No. 1 stack Feb. 9 for general rebuilding. It will resume production about Apr. 30. Of Chicago district's 43 blast furnaces, 42 are operating.

No offerings of foreign pig iron are reported on the West Coast. Consumers in that area have ample supplies of domestic iron.

ALL-HYDRAULIC !

SILENT HOIST KRANE KAR

HYDRAULIC
Boom Swinging
Boom Topping
Boom Telescoping
Load Hoisting

Originator and leader in its class for 30 years, KRANE KAR goes ALL-HYDRAULIC. Affords amazing ease of handling . . . touch control of all crane operations . . . with other engineering advances that simplify operator's work . . . eliminating gear shifting and clutch replacements . . . cutting maintenance to the bone and setting new standards of efficiency and productivity. Get the details. *Write, wire, telephone today.*

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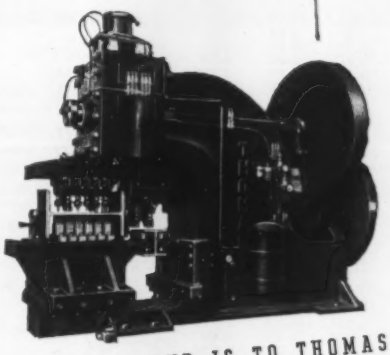
POWER STEERING

MODELS 1000 TO 25,000 LBS. CAP.

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
849 63rd Street, Brooklyn 20, N. Y.

BEAM PUNCHING
without tool change



THE newly designed Thomas Beam Punches are built in sizes to handle beams up to 12"-18"-24"-30" and 36", web and flange punching, with a single tool set-up. Any of the five sizes may be used with or without a Thomas spacing Table, depending on production needs.

THE TREND IS TO THOMAS

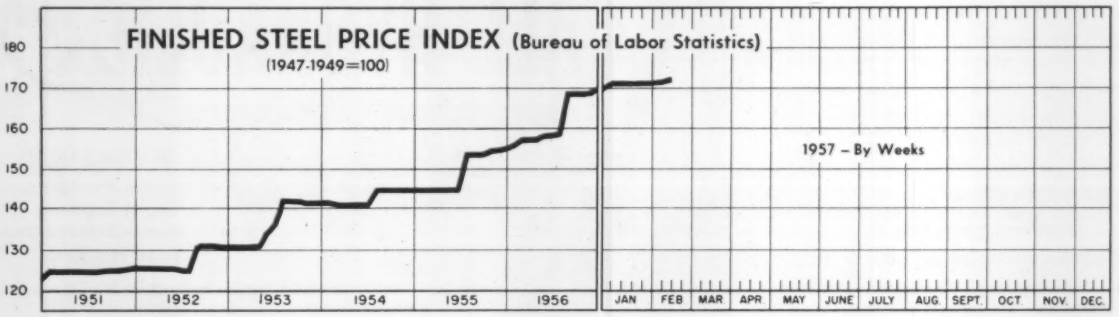
• *Write for further information*

THOMAS
MACHINE MANUFACTURING CO.
PITTSBURGH 23, PA.

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

51 a

Price Indexes and Composites



Feb. 12 1957	Week Ago	Month Ago	Jan. Avg.	Year Ago
173.0	171.9	171.1	171.1	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Feb. 12

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$5.150	Bars, Reinforcing	5.788
Rails, Light, 40 lb	6.567	Bars, C.F., Carbon	9.670
Tie Plates	6.025	Bars, C.F., Alloy	13.325
Axles, Railway	9.317	Bars, C.F., Stainless, 302 (lb)	0.533
Wheels, Freight Car, 33 in. (per wheel)	57.50	Sheets, H.R., Carbon	5.945
Plates, Carbon	5.900	Sheets, C.R., Carbon	6.789
Structural Shapes	5.667	Sheets, Galvanized	8.220
Bars, Tool Steel, Carbon (lb)	0.480	Sheets, C.R., Stainless, 302 (lb)	0.660
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.585	Sheets, Electrical	11.225
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274	Strip, C.R., Carbon	8.843
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.769	Strip, C.R., Stainless, 403 (lb)	0.475
Bars, H.R., Alloy	10.088	Strip, H.R., Carbon	6.000
Bars, H.R., Stainless, 303 (lb)	0.508	Pipe, Black, Buttweld (100 ft)	18.791
Bars, H.R., Carbon	6.075	Pipe, Galv, Buttweld (100 ft)	22.930
		Pipe, Line (100 ft)	190.108
		Casing, Oil Well, Carbon (100 ft)	183.686
		Casing, Oil Well Alloy (100 ft)	284.943
		Tubes, Boiler (100 ft)	45.670
		Tubing, Mechanical, Carbon (100 ft)	23.367
		Tubing, Mechanical, Stainless, 304 (100 ft)	197.663
		Tin Plate, Hot-dipped, 1.25 lb	9.433
		Tin Plate, Electrolytic, 0.25 lb	8.133
		Black Plate, Canmaking Quality	7.233
		Wire, Drawn, Carbon	9.325
		Wire, Drawn, Stainless, 430 (lb)	0.630
		Bale Ties (bundle)	7.213
		Nails, Wire, 8d Common	9.365
		Wire, Barbed (80-rod spool)	8.412
		Woven Wire Fence (20-rod roll)	20.505

STEEL's FINISHED STEEL PRICE INDEX*

	Feb. 13 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	225.92	225.92	225.92	209.10	171.92
Index in cents per lb	6.111	6.111	6.111	5.665	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel NT*	$137.98	$137.98	$137.98	$127.91	$106.32
No. 2 Fdry Pig Iron, GT	62.63	62.63	62.63	58.99	52.54
Basic Pig Iron, GT	62.18	62.18	62.18	58.49	52.16
Malleable Pig Iron, GT	63.41	63.41	63.41	59.77	53.27
Steelmaking Scrap, GT	53.17	55.17	59.83	49.00	43.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Feb. 13 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	5.075	5.075	5.075	4.65	3.70
Bars, H.R., Chicago	5.075	5.075	5.075	4.65	3.70
Bars, H.R., deld, Philadelphia	5.365	5.365	5.365	4.90	4.223
Bars, C.F., Pittsburgh	6.85*	6.85*	6.85*	6.25*	4.55
Shapes, Std., Pittsburgh	5.00	5.00	5.00	4.60	3.65
Shapes, Std., Chicago	5.00	5.00	5.00	4.60	3.65
Shapes, deld., Philadelphia	5.31	5.31	5.31	4.88	3.918
Plates, Pittsburgh	4.85	4.85	4.85	4.50	3.70
Plates, Chicago	4.85	4.85	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.25	5.25	5.25	4.80	4.15
Plates, Sparrows Point, Md.	4.85	4.85	4.85	4.50	3.70
Plates, Claymont, Del.	5.70	5.70	5.70	4.80	4.15
Sheets, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.675	4.675	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Chicago	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Detroit	5.75-5.85	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.30	6.30	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.675	4.675	4.675	4.325	3.50
Strip, C.R., Pittsburgh	6.85	6.85	6.85	6.25	4.65-5.35
Strip, C.R., Chicago	6.85	6.85	6.85	6.25-6.35	4.90
Strip, C.R., Detroit	6.95	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.20	7.20	7.20	6.60	4.85-5.10
Nails, Wire, Pittsburgh	8.20	8.20	8.20	7.60	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.95	$9.95	$9.95	$9.45	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$91.50	$91.50	$91.50	$84.50	$66.00
Wire rods, $\frac{7}{32}$-$\frac{1}{2}$" Pitts.	5.80	5.80	5.80	5.025-5.375	4.10-4.30

PIG IRON, Gross Ton	Feb. 13 1957	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$63.50	$63.50	$63.50	$59.50	$53.00
Basic, Valley	62.50	62.50	62.50	58.50	52.00
Basic, deld., Phila.	66.26	66.26	66.26	62.16	56.61
No. 2 Fdry, NevilleIsland,Pa.	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, Chicago	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, deld., Phila.	66.76	66.76	66.76	62.66	57.11
No. 2 Fdry, Birm.	59.00	59.00	59.00	55.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	55.49
Malleable, Valley	63.00	63.00	63.00	59.00	52.50
Malleable, Chicago	63.00	63.00	63.00	59.00	52.50
Ferromanganese, Duquesne.	255.00†	255.00†	255.00†	205.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$53.50	$54.50	$62.50	$49.00	$44.00
No. 1 Heavy Melt, E. Pa.	58.00	59.00	59.00	51.00	42.50
No. 1 Heavy Melt, Chicago	48.00	52.00	58.00	47.00	42.50
No. 1 Heavy Melt, Valley	53.50	53.50	63.50	52.50	44.00
No. 1 Heavy Melt, Cleve.	51.50	51.50	60.50	49.50	43.00
No. 1 Heavy Melt, Buffalo	53.50	53.50	61.50	46.50	43.00
Rails, Rerolling, Chicago	64.50	71.00	82.50	66.00	52.50
No. 1 Cast, Chicago	45.50	46.50	50.50	46.50	49.00

COKE, Net Ton					
Beehive, Furn, Connisvl.	$15.25	$15.00	$15.00	$14.125	$14.75
Beehive, Fdry, Connisvl.	18.00	18.00	18.00	16.50	17.50

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key producers, page 238; to footnotes, page 240.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$70.50

INGOTS, Alloy (NT)

Detroit R7 .....$74.00
Houston S5 .....74.00
Midland,Pa. C18 .....74.00
Munhall,Pa. U5 .....74.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. U5 .....$74.00
Bridgeport,Conn. N19 ..79.00
Buffalo R2 .....74.00
Clairton,Pa. U5 .....74.00
Ensley,Ala. T2 .....74.00
Fairfield,Ala. T2 .....74.00
Fontana,Calif. K1 ....83.50
Gary,Ind. U5 .....74.00
Johnstown,Pa. B2 ....74.00
Lackawanna,N.Y. B2 ..74.00
LoneStar,Tex. L6 .....80.00
Munhall,Pa. U5 .....74.00
S.Chicago,Ill. R2, U5..74.00
S.Duquesne,Pa. U5 ....74.00
Sterling,Ill. N15 .....74.00
Youngstown R2 .....74.00

Carbon, Forging (NT)

Bessemer,Pa. U5 .....$91.50
Bridgeport,Conn. N19 ..96.50
Buffalo R2 .....91.50
Canton,O. R2 .....94.00
Clairton,Pa. U5 .....91.50
Conshohocken,Pa. A3 ..96.50
Ensley,Ala. T2 .....91.50
Fairfield,Ala. T2 .....91.50
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 .....91.50
Geneva,Utah C11 .....91.50
Houston S5 .....96.50
Johnstown,Pa. B2 ....91.50
Lackawanna,N.Y. B2 ..91.50
LosAngeles B3 .....101.00
Midland,Pa. C18 .....91.50
Munhall,Pa. U5 .....91.50
Seattle B3 .....105.00
S.Chicago R2, U5, W14 91.50
S.Duquesne,Pa. U5 ....91.50
S.SanFrancisco B3 ...101.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$107.00
Bridgeport,Conn. N19. 107.00
Buffalo R2 .....107.00
Canton,O. R2 .....107.00
Conshohocken,Pa. A3 .114.00
Detroit R7 .....107.00
Fontana,Calif. K1 ....128.00
Gary,Ind. U5 .....107.00
Houston S5 .....112.00
Ind.Harbor,Ind. Y1 ..107.00
Johnstown,Pa. B2 ....107.00
Lackawanna,N.Y. B2 .107.00
LosAngeles B3 .....127.00
Massillon,O. R2 .....107.00
Midland,Pa. C18 .....107.00
Munhall,Pa. U5 .....107.00
S.Chicago R2,U5,W14 .107.00
S.Duquesne,Pa. U5 ...107.00
Struthers,O. Y1 .....107.00
Warren,O. C17 .....107.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $116.50
Buffalo R2 .....111.50
Canton,O. R2 .....114.00
Cleveland,O. R2 .....111.50
Gary,Ind. U5 .....111.50
S.Chicago,Ill. R2, W14.111.50
S.Duquesne,Pa. U5 ...111.50

SKELP

Aliquippa,Pa. J5 .....4.725
LoneStar,Tex. L6 .....5.025
Munhall,Pa. U5 .....4.625
Warren,O. R2 .....4.625
Youngstown R2, U5 ...4.625

WIRE RODS

AlabamaCity,Ala. R2 ...5.80
Aliquippa,Pa. J5 .....5.80
Alton,Ill. L1 .....6.00
Buffalo W12 .....5.80
Cleveland A7 .....5.80
Donora,Pa. A7 .....5.80
Fairfield,Ala. T2 .....5.80
Houston S5 .....6.05
IndianaHarbor,Ind. Y1..5.80
Johnstown,Pa. B2 .....5.80
Joliet,Ill. A7 .....5.80
KansasCity,Mo. S5 .....6.05
Kokomo,Ind. C16 .....5.90
LosAngeles B3 .....6.60
Minnequa,Colo. C10 ....6.05
Monessen,Pa. P7 .....5.80
N.Tonawanda,N.Y. B11.5.80
Pittsburg,Calif. C11 ....6.45
Portsmouth,O. P12 ....5.80
Roebling,N.J. R5 .....5.90
S.Chicago,Ill. R2 .....5.80
SparrowsPoint,Md. B2 ..5.90
Sterling,Ill.(1) N15 ....5.80
Sterling,Ill. N15 .....5.90
Struthers,O. Y1 .....5.80
Worcester,Mass. A7 ....6.10

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....5.00
Aliquippa,Pa. J5 .....5.00
Bessemer,Ala. T2 .....5.00
Bethlehem,Pa. B2 .....5.05
Birmingham C15 .....5.25
Clairton,Pa. U5 .....5.00
Fairfield,Ala. T2 .....5.00
Fontana,Calif. K1 .....5.75
Gary,Ind. U5 .....5.00
Geneva,Utah C11 .....5.00
Houston S5 .....5.10
Ind.Harbor,Ind. I-2 ....5.00
Johnstown,Pa. B2 .....5.05
KansasCity,Mo. S5 .....5.10
Lackawanna,N.Y. B2 ..5.05
LosAngeles B3 .....5.70
Minnequa,Colo. C10 ....5.30
Munhall,Pa. U5 .....5.00
Niles,Calif. P1 .....5.75
Phoenixville,Pa. P4 ....5.85
Portland,Oreg. O4 .....5.80
Seattle B3 .....5.75
S.Chicago,Ill. U5, W14..5.00
S.SanFrancisco B3 .....5.65
Sterling,Ill. N15 .....5.00
Torrance,Calif. C11 ....5.70
Weirton,W.Va. W6 .....5.00

Wide Flange

Bethlehem,Pa. B2 .....5.05
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 .....5.90
IndianaHarbor,Ind. I-2..5.25
Lackawanna,N.Y. B2 ...5.05
Munhall,Pa. U5 .....5.00
Phoenixville,Pa. P4 ....5.85
S.Chicago,Ill. U5 .....5.00

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.20
Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston S5 .....6.30
Munhall,Pa. U5 .....6.20
S.Chicago,Ill. U5 .....6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....7.35
Bessemer,Ala. T2 .....7.35
Bethlehem,Pa. B2 .....7.40
Clairton,Pa. U5 .....7.35
Fairfield,Ala. T2 .....7.35
Fontana,Calif. K1 .....8.10
Gary,Ind. U5 .....7.35
Geneva,Utah C11 .....7.35
Houston S5 .....7.45
Ind.Harbor,Ind. I-2, Y1..7.35
Johnstown,Pa. B2 .....7.40
KansasCity,Mo. S5 .....7.45
Lackawanna,N.Y. B2 ...7.40
LosAngeles B3 .....8.05
Munhall,Pa. U5 .....7.35
Seattle B3 .....8.10
S.Chicago,Ill. U5, W14..7.35
S.SanFrancisco B3 .....8.00
Struthers,O. Y1 .....7.35

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....7.40
Lackawanna,N.Y. B2 ...7.40
Munhall,Pa. U5 .....7.35
S.Chicago,Ill. U5 .....7.35

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.05
Lackawanna,N.Y. B2 ...5.05
Munhall,Pa. U5 .....5.00
S.Chicago,Ill. U5 .....5.00

STEEL SHEET PILING

Lackawanna,N.Y. B2 ...5.90
Munhall,Pa. U5 .....5.90
S.Chicago,Ill. U5 .....5.90

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.85
Aliquippa,Pa. J5 .....4.85
Ashland,Ky.(15) A10 ...4.85
Bessemer,Ala. T2 .....4.85
Bridgeport,Conn. N19 ..4.75
Clairton,Pa. U5 .....4.85
Claymont,Del. C22 .....5.70
Cleveland J5, R2 .....4.95
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ...4.95
Detroit M1 .....4.95
Ecorse,Mich. G5 .....4.95
Fairfield,Ala. T2 .....4.85
Fontana,Calif.(30) K1 ..5.60
Gary,Ind. U5 .....4.85
Geneva,Utah C11 .....4.85
GraniteCity,Ill. G4 .....5.05
Harrisburg,Pa. P4 .....5.80
Houston S5 .....4.95
Ind.Harbor,Ind. I-2, Y1..4.85
Johnstown,Pa. B2 .....4.85
Lackawanna,N.Y. B2 ...4.85
LoneStar,Tex. L6 .....5.20
Minnequa,Colo. C10 ....5.70
Munhall,Pa. U5 .....4.85
Newport,Ky. A2 .....4.85
Phoenixville,Pa. P4 ....5.85
Riverdale,Ill. A1 .....4.85
Seattle B3 .....5.75
Sharon,Pa. S3 .....4.85
S.Chicago,Ill. U5, W14..4.85
SparrowsPoint,Md. B2 ..4.85
Steubenville,O. W10 ....4.85
Warren,O. R2 .....4.85
Youngstown R2, U5, Y1.4.85

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....6.20
Fontana,Calif. K1 .....6.75
Geneva,Utah C11 .....6.00
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 .....11.95

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.25
Bessemer,Ala. T2 .....7.25
Clairton,Pa. U5 .....7.25
Claymont,Del. C22 .....7.55
Cleveland J5, R2 .....7.25
Coatesville,Pa. L7 .....7.55
Conshohocken,Pa. A3 ..7.25
Ecorse,Mich. G5 .....7.35
Fairfield,Ala. T2 .....7.25
Fontana,Calif.(30) K1 ..8.00
Gary,Ind. U5 .....7.25
Geneva,Utah C11 .....7.25
Houston S5 .....7.35
Ind.Harbor,Ind. I-2, Y1.7.25
Johnstown,Pa. B2 .....7.25
Munhall,Pa. U5 .....7.25
Pittsburgh J5 .....7.25
Seattle B3 .....8.15
Sharon,Pa. S3 .....7.25
S.Chicago,Ill. U5, W14..7.25
SparrowsPoint,Md. B2 ..7.25
Warren,O. R2 .....7.25
Youngstown U5, Y1 ....7.25

PLATES, Alloy

Aliquippa,Pa. J5 .....6.85
Bridgeport,Conn. N19 ..6.55
Claymont,Del. C22 .....6.85
Coatesville,Pa. L7 .....6.85
Fontana,Calif.(30) K1 ..7.60
Gary,Ind. U5 .....6.85
Houston S5 .....6.95
Ind.Harbor,Ind. Y1 .....6.85
Johnstown,Pa. B2 .....6.85
Munhall,Pa. U5 .....6.85
Newport,Ky. A2 .....6.85
Pittsburgh J5 .....6.85
Seattle B3 .....7.75
Sharon,Pa. S3 .....6.85
S.Chicago,Ill. U5, W14..6.85
SparrowsPoint,Md. B2 ..6.85
Youngstown Y1 .....6.85

FLOOR PLATES

Cleveland J5 .....5.925
Conshohocken,Pa. A3 ..5.925
Harrisburg,Pa. P4 ....6.275
Ind.Harbor,Ind. I-2 ...5.925
Munhall,Pa. U5 .....5.925
S.Chicago,Ill. U5 .....5.925

PLATES, Ingot Iron

Ashland c.l. (15) A10..5.10
Ashland l.c.l. (15) A10..5.60
Cleveland c.l. R2 .....5.60
Warren,O. c.l. R2 .....5.60

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.075
Aliquippa,Pa.(9) J5 ...5.075
Alton,Ill. L1 .....5.275
Atlanta(9) A11 .....5.575
Bessemer,Ala.(9) T2 ..5.075
Birmingham(9) C15 ....5.325
Bridgeport,Conn. N19 ..5.30
Buffalo(9) R2 .....5.075
Clairton,Pa. U5 .....5.075
Cleveland(9) R2 .....5.075
Ecorse,Mich.(9) G5 ...5.175
Emeryville,Calif. J7 ....5.85
Fairfield,Ala.(9) T2 ...5.075
Fairless,Pa.(9) U5 ....5.225
Fontana,Calif.(9) K1 ..5.775
Gary,Ind.(9) U5 .....5.075
Geneva,Utah(9) C11 ....5.175
Houston(9) S5 .....5.325
Ind.Harbor(9) I-2, Y1..5.075
Johnstown,Pa.(9) B2 ..5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo.(9) S5..5.325
Lackawanna(9) B2 ....5.075
LosAngeles(9) B3 .....5.775
Milton,Pa. M18 .....5.225
Minnequa,Colo. C10 ....5.525
Niles,Calif. P1 .....5.85
N.T'wanda,N.Y.(9) B11 5.075
Pittsburg,Calif.(9) C11.5.775
Pittsburgh(9) J5 .....5.075
Portland,Oreg. O4 .....5.85
Seattle B3, N14 .....5.825
S.Ch'c'go(9)R2,U5,W14 5.075
S.Duquesne,Pa.(9) U5 .5.075
S.SanFran.,Calif.(9) B3 5.825
Sterling,Ill.(1) N15 ....5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif.(9) C11.5.775
Youngstown(9) R2, U5 5.075

BARS, H.R. Leaded Alloy (Including leaded extra)

Warren,O. C17 .....7.125

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.125
Bethlehem,Pa. B2 .....6.125
Bridgeport,Conn. N19 ..6.20
Buffalo R2 .....6.125
Canton,O. R2 .....6.125
Clairton,Pa. U5 .....6.125
Detroit R7 .....6.125
Ecorse,Mich. G5 .....6.225
Fairless,Pa. U5 .....6.275
Fontana,Calif. K1 .....7.175
Gary,Ind. U5 .....6.125
Houston S5 .....6.375
Ind.Harbor,Ind. I-2,Y1.6.125
Johnstown,Pa. B2 .....6.125
KansasCity,Mo. S5 ....6.375
Lackawanna,N.Y. B2 ..6.125
LosAngeles B3 .....7.175
Massillon,O. R2 .....6.125
Midland,Pa. C18 .....6.125
Pittsburgh J5 .....6.125
S.Chicago R2,U5,W14 ..6.125
S.Duquesne,Pa. U5 ....6.125
Struthers,O. Y1 .....6.125
Warren,O. C17 .....6.125
Youngstown U5 .....6.125

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.425
Bessemer,Ala. T2 .....7.425
Bethlehem,Pa. B2 .....7.425
Bridgeport,Conn. N19 ..7.50
Clairton,Pa. U5 .....7.425
Cleveland R2 .....7.425
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.425
Fontana,Calif. K1 .....8.125
Gary,Ind. U5 .....7.425
Houston S5 .....7.675
Ind.Harbor,Ind. Y1 .....7.425
Johnstown,Pa. B2 .....7.425
KansasCity,Mo. S5 .....7.675
Lackawanna,N.Y. B2 ..7.425
LosAngeles B3 .....8.125
Pittsburgh J5 .....7.425
Seattle B3 .....8.175
S.Chicago,Ill. U5, W14..7.425
S.Duquesne,Pa. U5 ....7.425
S.SanFrancisco B3 ....8.175
Struthers,O. Y1 .....7.425
Youngstown U5 .....7.425

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.225
Houston S5 .....5.325
KansasCity,Mo. S5 ....5.325
Lackawanna(9) B2 ....5.075
Sterling,Ill. N15 .....5.175
Sterling,Ill.(1) N15 ...5.075

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....5.075
Atlanta A11 .....5.575
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.85
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SanFrancisco S7 .....5.95

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.20
Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston S5 .....6.45
KansasCity,Mo. S5 .....6.45
Pittsburgh J5 .....6.20
Youngstown U5 .....6.20

BARS, C.F. Leaded Alloy (Including leaded extra)

Ambridge,Pa. W18 ....9.475
BeaverFalls,Pa. M12 ..9.475
Chicago W18 .....9.475
Cleveland C20 .....9.475
LosAngeles S30 .....11.10
LosAngeles P2 .....*11.35*
Monaca,Pa. S17 .....9.475
Newark,N.J. W18 .....9.65
Warren,O. C17 .....9.475

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....6.85
BeaverFalls,Pa. M12,R2..6.85
Birmingham C15 .....7.45
Bridgeport,Conn. N19 ...7.20
Buffalo B5 .....6.90
Camden,N.J. P13 .....7.30
Carnegie,Pa. C12 .....6.85
Chicago W18 .....6.85
Cleveland A7, C20 .....6.85
Detroit B5, P17 .....7.05
Detroit R7 .....6.85
Donora,Pa. A7 .....6.85
Elyria,O. W8 .....6.85
FranklinPark,Ill. N5....6.85
Gary,Ind. U5 .....6.85
GreenBay,Wis. F7 .....6.85
Hammond,Ind. L2, M13..6.85
Hartford,Conn. R2 .....7.35
Harvey,Ill. B5 .....6.85
LosAngeles(49) S30 ....8.30
LosAngeles R2 .....8.75
LosAngeles P2 .....8.30
Mansfield,Mass. B5 ....7.40
Massillon,O. R2, R8 ...6.85
Midland,Pa. C18 .....6.85
Monaca,Pa. S17 .....6.85
Newark,N.J. W18 .....7.30
NewCastle,Pa.(17) B4 ..6.85
Pittsburgh J5 .....6.85
Plymouth,Mich. P5 .....7.10
Putnam,Conn. W18 .....7.40
Readville,Mass. C14 ....7.40
S.Chicago,Ill. W14 .....6.85
SpringCity,Pa. K3 .....7.30
Struthers,O. Y1 .....6.85
Waukegan,Ill. A7 .....6.85
Youngstown F3, Y1 ....6.85

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....8.325
BeaverFalls,Pa.M12,R2 8.325
Bethlehem,Pa. B2 .....8.325
Bridgeport,Conn. N19 ..8.475
Buffalo B5 .....8.325
Camden,N.J. P13 .....8.50
Canton,O. T7 .....8.325
Carnegie,Pa. C12 .....8.325
Chicago W18 .....8.325
Cleveland A7, C20 .....8.325
Detroit B5, P17 .....8.525
Detroit R7 .....8.325
Donora,Pa. A7 .....8.325
Elyria,O. W8 .....8.325
FranklinPark,Ill. N5 ..8.325
Gary,Ind. R2 .....8.325
GreenBay,Wis. F7 .....8.325
Hammond,Ind. L2, M13 8.325
Hartford,Conn. R2 ....8.625
Harvey,Ill. B5 .....8.325
Lackawanna,N.Y. B2 ..8.325
LosAngeles S30 .....10.10
LosAngeles P2 .....*10.20*
Mansfield,Mass. B5 ...8.625
Massillon,O. R2, R8 ...8.325
Midland,Pa. C18 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
Plymouth,Mich. P5 ....8.525
S.Chicago W14 .....8.325
SpringCity,Pa. K3 .....8.50
Struthers,O. Y1 .....8.325
Warren,O. C17 .....8.325
Waukegan,Ill. A7 .....8.325
Worcester,Mass. A7 ...8.625
Youngstown F3, Y1 ...8.325

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....5.075
Atlanta A11 .....5.575
Birmingham C15 .....*5.325*
Bridgeport,Conn. N19 ..5.30
Buffalo R2 .....5.075
Cleveland R2 .....5.075
Ecorse,Mich. G5 .....5.425
Emeryville,Calif. J7 ....5.85

Fairfield,Ala. T2 .....5.075
Fairless,Pa. U5 .....5.225
Ft.Worth,Tex.(42) T4 .5.525
Gary,Ind. U5 .....5.075
Houston S5 .....5.325
Ind.Harbor,Ind. I-2, Y1 5.075
Johnstown,Pa. B2 .....5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo. S5 .....5.325
Lackawanna,N.Y. B2 ..5.075
LosAngeles B3 .....5.775
Milton,Pa. M18 .....5.225
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.85
Pittsburg,Calif. C11 ..5.775
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SandSprings,Okla. S5 ..5.575
Seattle B3, N14 .....5.825
S.Chicago,Ill. R2 .....5.075
S.Duquesne,Pa. U5 ....5.075
S.SanFrancisco B3 ....5.825
SparrowsPoint,Md. B2..5.075
Sterling,Ill.(1) N15 ...5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif. C11 ...5.775
Youngstown R2, U5 ....5.075

BARS, Reinforcing (Fabricated; to Consumers)

Chicago U8 .....6.81
Cleveland U8 .....6.79
Johnstown,Pa. ¼-1" B2.6.73
KansasCity,Mo. S5 .....7.00
Marion,O. P11 .....6.70
NewYork U8 .....7.20
Pittsburgh J5, U8 .....6.75
Seattle B3, N14 .....7.20
SparrowsPt. ½-1" B2 ..6.73
Williamsport,Pa. S19 ...6.65

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2.5.075
ChicagoHts.(4) I-2 .....6.10
ChicagoHts.(4) C2 .....5.65
Ft.Worth,Tex.(26) T4..5.525
Franklin,Pa.(3) F5 .....5.10
Franklin,Pa.(4) F5 .....6.10
JerseyShore,Pa.(4) J8 ..5.50
Marion,O.(3) P11 .....5.15
Moline,Ill.(3) R2 .....5.225
Tonawanda(3) B12 .....5.65
Tonawanda(4) B12 .....6.15
Williamsport,Pa.(3) S19.5.65

BARS, Wrought Iron

Economy,Pa.(S.R.) B14 13.15
Economy,Pa.(D.R.)B14 16.35
Economy(Staybolt)B14, 16.80
McK.Rks.(S.R.) L5 ...13.15
McK.Rks.(D.R.) L5 ...18.00
McK.Rks.(Staybolt) L5.19.15

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2 .....4.675
Allenport,Pa. P7 .....4.675
Ashland,Ky.(8) A10 ..4.675
Cleveland J5, R2 .....4.675
Conshohocken,Pa. A3 ..4.725
Detroit(8) M1 .....4.775
Dravosburg,Pa. U5 ....4.675
Ecorse,Mich. G5 .....4.775
Fairfield,Ala. T2 .....4.675
Fairless,Pa. U5 .....4.725
Fontana,Calif. K1 .....5.525
Gary,Ind. U5 .....4.675
Geneva,Utah C11 .....4.775
GraniteCity,Ill.(8) G4 ..4.875
Ind.Harbor,Ind. I-2, Y1 4.675
Lackawanna,N.Y. B2 ..4.675
Munhall,Pa. U5 .....4.675
Newport,Ky.(8) A2 ....4.675
Niles,O. M21 .....4.675
Pittsburg,Calif. C11 ...5.375
Pittsburgh J5 .....4.675
Portsmouth,O. P12 .....4.675
Riverdale,Ill. A1 .....4.675
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 .....4.675
SparrowsPoint,Md. B2..4.675
Steubenville,O. W10 ...4.675
Warren,O. R2 .....4.675
Weirton,W.Va. W6 ....4.675
Youngstown U5, Y1 ...4.675

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21 .....5.75

SHEETS, H.R. Alloy

Dravosburg,Pa. U5 ....7.75
Gary,Ind. U5 .....7.75
Ind.Harbor,Ind. Y1 ....7.75
Newport,Ky. A2 .....7.75
Youngstown Y1, U5 ....7.75

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....6.90
Conshohocken,Pa. A3 ...6.95
Dravosburg,Pa. U5 ....6.90
Ecorse,Mich. G5 .....7.00
Fairfield,Ala. T2 .....6.90
Fairless,Pa. U5 .....6.95
Fontana,Calif. K1 .....7.75
Gary,Ind. U5 .....6.90
Ind.Harbor,Ind. I-2, Y1 6.90
Lackawanna(35) B2 ....6.90
Munhall,Pa. U5 .....6.90
Pittsburgh J5 .....6.90
S.Chicago,Ill. U5 .....6.90
SparrowsPoint(36) B2 ..6.90
Warren,O. R2 .....6.90
Weirton,W.Va. W6 .....6.90
Youngstown U5, Y1 ....6.90

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..4.925
Cleveland R2 .....5.425
Ind.Harbor,Ind. I-2 ...4.925
Warren,O. R2 .....5.425

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 .....5.75
Cleveland J5, R2 .....5.75
Conshohocken,Pa. A3 ...5.80
Detroit M1 .....5.75
Dravosburg,Pa. U5 ....5.75
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.75
Fairless,Pa. U5 .....5.80
Follansbee,W.Va. F4 ...5.75
Fontana,Calif. K1 .....7.00
Gary,Ind. U5 .....5.75
GraniteCity,Ill. G4 ....5.95
Ind.Harbor,Ind. I-2, Y1 5.75
Lackawanna,N.Y. B2 ..5.75
Mansfield,O. E6 .....5.75
Middletown,O. A10 ....5.75
Newport,Ky. A2 .....5.75
Pitsburg,Calif. C11 ....6.70
Pittsburgh J5 .....5.75
Portsmouth,O. P12 ....5.75
SparrowsPoint,Md. B2..5.75
Steubenville,O. W10 ....5.75
Warren,O. R2 .....5.75
Weirton,W.Va. W6 .....5.75
Yorkville,O. W10 .....5.75
Youngstown Y1 .....5.75

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 ....8.525
Dravosburg,Pa. U5 ....8.525
Ecorse,Mich. G5 .....8.625
Fairless,Pa. U5 .....8.575
Fontana,Calif. K1 ....9.775
Gary,Ind. U5 .....8.525
IndianaHarbor,Ind. Y1.8.525
Lackawanna(37) B2 ...8.525
Pittsburgh J5 .....8.525
SparrowsPoint(38) B2 .8.525
Warren,O. R2 .....8.525
Weirton,W.Va. W6 ....8.525
Youngstown Y1 .....8.525

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.50
Middletown,O. A10 ....6.25
Warren,O. R2 .....6.50

SHEETS, Culvert	Cu Steel	Cu Fe
Ashland,Ky. A10	6.65	6.90
Canton,O. R2	6.65	7.15
Dravosburg U5	6.65	6.90
Fairfield T2	6.65	6.90
Gary,Ind. U5	6.65	6.90
GraniteCity,Ill. G4	6.85	...
Ind.Harbor I-2	6.65	6.90
Kokomo,Ind. C16	6.75	...
MartinsFry. W10	6.65	...
Pittsburgh J5	6.65	...
Pitts.,Calif. C11	7.40	...
SparrowsPt. B2	6.65	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....6.90
MartinsFry.,O. W10 ....6.90

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 .....6.30‡
Ashland,Ky. A10 .....6.30†
Canton,O. R2 .....6.30‡
Dover,O. R1 .....6.30†
Dravosburg,Pa. U5 ....6.30†
Fairfield,Ala. T2 .....6.30†
Gary,Ind. U5 .....6.30†
GraniteCity,Ill. G4 ....6.50*
Ind.Harbor,Ind. I-2 ....6.30†
Kokomo,Ind. C16 .....6.40‡
MartinsFerry,O. W10 ..6.30*
Middletown,O. A10 ....6.30†
Pittsburg,Calif. C11 ...7.05*
Pittsburgh J5 .....6.30†
SparrowsPt.,Md. B2 ..6.30†
Warren,O. R2 .....6.30†
Weirton,W.Va. W6 ....6.30*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....7.025

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 ...9.275
SparrowsPoint(39) B2..9.275

SHEETS, Galvanneal Steel

Canton,O. R2 .....6.70
Dravosburg,Pa. U5 ....6.70

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 .....6.55
Middletown,O. A10 ....6.55

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.125
Niles,O.(28) R2 .....7.125
Weirton,W.Va. W6 ....6.975

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 8.95
Butler,Pa. A10 (type 2) 9.05

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.325
Cleveland R2 .....6.325
Dravosburg,Pa. U5 ....6.325
Gary,Ind. U5 .....6.325
GraniteCity,Ill. G4 ....6.525
Ind.Harbor,Ind. I-2, Y1 6.325
Middletown,O. A10 ....6.325
Niles,O. M21 .....6.325
Youngstown Y1 .....6.325

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...8.35
Ind Harbor,Ind. I-2 ...8.175
Yorkville,O. W10 .....8.175

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 6.70
Gary,Ind. U5 .....6.70
Mansfield,O. E6 .....6.70
Middletown,O. A10 ....6.70
Niles,O. M21 .....6.70
Weirton,W.Va. W6 ....6.70

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.10

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U.S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston Division, H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman & Scott
M21 Mallory-Sharon Titanium Corp.

N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W. Co.
N19 Northeastern Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn.Coal & Iron Div., U.S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U.S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U.S. Steel Supply Div., U.S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.675
Allenport,Pa. P7	4.675
Alton,Ill. L1	4.875
Ashland,Ky.(8) A10	4.675
Atlanta A11	4.875
Bessemer,Ala. T2	4.675
Birmingham C15	4.925
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.675
Conshohocken,Pa. A3	4.725
Detroit M1	4.775
Ecorse,Mich. G5	4.775
Fairfield,Ala. T2	4.675
Fontana,Calif. K1	5.525
Gary,Ind. U5	4.675
Houston S5	4.925
Ind.Harbor,Ind. I-2, Y1	4.675
Johnstown,Pa.(25) B2	4.675
KansasCity,Mo. S5	4.925
Lackaw'na,N.Y.(25) B2	4.675
LosAngeles(25) B3	5.425
Minnequa,Colo. C10	5.775
Pittsburg,Calif. C11	5.425
Riverdale,Ill. A1	4.675
SanFrancisco S7	5.95
Seattle(25) B3	5.675
Seattle N14	5.675
Sharon,Pa. S3	4.675
S.Chicago,Ill. W14	4.675
S.SanFrancisco(25) B3	5.425
SparrowsPoint,Md. B2	4.675
Sterling,Ill.(1) N15	4.675
Sterling,Ill. N15	4.775
Torrance,Calif. C11	5.425
Warren,O. R2	4.675
Weirton,W.Va. W6	4.675
Youngstown U5	4.675

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.75
Gary,Ind. U5	7.75
Ind.Harbor,Ind. Y1	7.75
LosAngeles B3	8.95
Newport,Ky. A2	7.75
Sharon,Pa. S3	7.75
S.Chicago,Ill. W14	7.75
Youngstown U5, Y1	7.75

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	6.95
Conshohocken,Pa. A3	6.95
Ecorse,Mich. G5	7.05
Fairfield,Ala. T2	6.95
Gary,Ind. U5	6.95
Houston S5	7.20
Ind.Harbor,Ind. I-2, Y1	6.95
KansasCity,Mo. S5	7.20
Lackawanna,N.Y. B2	6.95
LosAngeles(25) B3	7.70
Seattle(25) B3	7.95
Sharon,Pa. S3	6.95
S.SanFrancisco(25) B3	7.70
SparrowsPoint,Md. B2	6.95
Warren,O. R2	6.95
Weirton,W.Va. W6	6.95
Youngstown U5 Y1	6.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.925
Warren,O. R2	5.425

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.85
Baltimore T6	6.85
Boston T6	7.40
Buffalo S40	6.85
Cleveland A7, J5	6.85
Conshohocken,Pa. A3	6.90
Dearborn,Mich. D3	6.95
Detroit D2, M1, P20	6.95
Dover,O. G6	6.85
Ecorse,Mich. G5	6.95
Follansbee,W.Va. F4	6.85
Fontana,Calif. K1	8.70
FranklinPark,Ill. T6	6.95
Ind.Harbor,Ind. Y1	6.85
Indianapolis C8	7.00
LosAngeles C1	8.80
NewBedford,Mass. R10	7.30
NewBritain(10) S15	6.85
NewCastle,Pa. B4, E5	6.85
NewHaven,Conn. D2	7.30
NewKensington,Pa. A6	6.85
Pawtucket,R.I. R3	7.50
Pawtucket,R.I. N8	7.40
Pittsburgh J5	6.85
Riverdale,Ill. A1	6.95
Rome,N.Y.(32) R6	6.85
Sharon,Pa. S3	6.85
Trenton,N.J.(31) R5	8.30
Wallingford,Conn. W2	7.30
Warren,O. R2, T5	6.85
Weirton,W.Va. W6	6.85
Worcester,Mass. A7	7.40
Youngstown C8, Y1	6.85

STRIP, Cold-Rolled Alloy

Boston T6	14.90
Carnegie,Pa. S18	14.55
Cleveland A7	14.55
Dover,O. G6	14.55
FranklinPark,Ill. T6	14.55
Harrison,N.J. C18	14.55
Indianapolis C8	14.70
Pawtucket,R.I. N8	14.90
Sharon,Pa. S3	14.55
Worcester,Mass. A7	14.85
Youngstown C8	14.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.00
Dearborn,Mich. D3	10.10
Dover,O. G6	10.10
Ecorse,Mich. G5	10.10
Ind.Harbor,Ind. Y1	10.20
Sharon,Pa. S3	10.00
Warren,O. R2	10.00
Weirton,W.Va. W6	10.00
Youngstown Y1	10.20

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	7.60

STRIP, C.R. Electrogalvanized

Cleveland A7	6.85*
Dover,O. G6	6.85*
Riverdale,Ill. A1	6.95*
Warren,O. B9, T5	6.85*
Worcester,Mass. A7	7.40*
Youngstown C8	6.85*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.975

TIGHT COOPERAGE HOOP

Atlanta A11	5.40
Riverdale,Ill. A1	5.25
Sharon,Pa. S3	5.10
Youngstown U5	5.10

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	8.50	10.10	12.30	15.30	18.25
Boston T6	8.50	10.10	12.30	15.30	18.25
Bristol,Conn. W1	...	...	12.30	15.30	18.25
Carnegie,Pa. S18	...	9.80	12.00	15.00	....
Cleveland A7	7.95	9.80	12.00	15.00	17.95
Cleveland C7	...	9.80	12.00	15.00	17.95
Dover,O. G6	7.95	9.80	12.00	15.00	17.95
Detroit D2	*8.75*	*10.20*	*12.40*	*15.40*	....
Dearborn,Mich. D3	*8.75*	*10.20*	*12.40*	....	....
FranklinPark,Ill. T6	8.05	9.80	12.00	15.00	17.95
Harrison,N.J. C18	...	...	12.30	15.30	18.25
Indianapolis C8	8.10	9.95	12.00	15.00	17.95
NewBritain,Conn.(10) S15	7.95	9.80	12.00	15.00	17.95
NewCastle,Pa. B4, E5	7.95	9.80	12.00	15.00	....
NewHaven,Conn. D2	*9.10*	*10.40*	*12.60*	*15.60*	....
NewKensington,Pa. A6	7.95	9.80	12.00	15.00	....
NewYork W3	...	10.10	12.30	15.30	18.25
Pawtucket,R.I. N8	8.50	10.10	12.30	15.30	18.25
Riverdale,Ill. A1	8.05	9.80	12.00	15.00	17.95
Rome,N.Y.(32) R6	7.95	9.80	12.00	15.00	17.95
Sharon,Pa. S3	*8.65*	*10.10*	*12.30*	*15.30*	*18.25*
Trenton,N.J. R5	...	10.10	12.30	15.30	18.25
Wallingford,Conn. W2	8.40	10.10	12.30	15.30	18.15
Warren,O. T5	7.95	9.80	12.00	15.00	17.95
Weirton,W.Va. W6	*8.65*	*10.10*	*12.30*	*15.30*	*18.25*
Worcester,Mass. A7, T6	8.50	10.10	12.30	15.30	18.25
Youngstown C8	7.95	9.80	12.00	15.00	17.95

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	16.80	20.65	....
Buffalo W12	16.80	....	....
FranklinPark,Ill. T6	17.15	21.00	25.35
Harrison,N.J. C18	16.80	20.65	25.00
NewYork W3	16.80	20.65	25.00
Palmer,Mass. W12	16.80	....	....
Trenton,N.J. R5	16.80	20.65	25.00
Worcester,Mass. A7, T6	16.80	20.65	25.00
Youngstown C8	17.15	21.00	25.35

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	....	11.00	12.05	13.05
Brackenridge,Pa. A4	...	....	11.00	12.05	13.05
Mansfield,O. E6	9.20	10.35	11.00	12.05	13.05
Newport,Ky. A2	9.20	10.35	11.00	12.05	13.05
Niles,O. M21	9.20	10.35	11.00	12.05	....
Vandergrift,Pa. U5	...	10.35	11.00	12.05	13.05
Warren,O. R2	9.20	10.35	11.00	12.05	....
Zanesville,O. A10	...	10.35	11.00	12.05	13.05
Zanesville,O. A10 (FP coils)	...	10.85	11.525	12.575	13.55
Zanesville,O. A10 (SP coils)	...	....	11.025	12.075	13.05

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	....	11.525	12.575	13.55
GraniteCity,Ill. G4	9.40*	10.55*	11.225*†	12.275*	....
IndianaHarbor,Ind. I-2	9.20†	10.35*	11.025*†	12.075*	....
Mansfield,O. E6	9.70	10.85	11.525	12.575	13.55
Vandergrift,Pa. U5	9.20*	10.35*	11.025*†	12.075*†	13.05*
Vandergrift,Pa. U5	....	10.85†	11.525†‡	12.575†‡	13.55†
Warren,O. R2	9.20*	10.85	11.525	12.575	13.55

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grades T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	14.05	14.60	15.10	16.15
Brackenridge,Pa. A4	14.05	....	....	....
Vandergrift,Pa. U5	14.05	14.60	15.10	16.15
Zanesville,O. A10	14.05	14.60	15.10	16.15

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	16.90	18.50	19.00	19.50	....
Butler,Pa. A10	....	....	18.50	19.00	19.50	....
Vandergrift,Pa. U5	15.90	16.90	18.50	19.00	19.50	14.55**
Warren,O. R2	....	....	....	....	....	14.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$8.40	$8.65	$9.05
Dravosburg,Pa. U5	8.40	8.65	9.05
Fairfield,Ala. T2	8.50	8.75	9.15
Fairless,Pa. U5	8.50	8.75	9.15
Fontana,Calif. K1	9.15	9.40	9.80
Gary,Ind. U5	8.40	8.65	9.05
GraniteCity,Ill. G4	8.50	8.75	9.15
IndianaHarbor,Ind. I-2, Y1	8.40	8.65	9.05
Niles,O. R2	8.40	8.65	9.05
Pittsburg,Calif. C11	9.15	9.40	9.80
SparrowsPoint,Md. B2	8.50	8.75	9.15
Weirton,W.Va. W6	8.40	8.65	9.05
Yorkville,O. W10	8.40	8.65	9.05

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	7.425	7.625	....
Niles,O. R2	7.425	7.625	7.925

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.70	$9.95
Dravosburg,Pa. U5	9.70	9.95
Fairfield,Ala. T2	9.80	10.05
Fairless,Pa. U5	9.80	10.05
Fontana,Calif. K1	10.45	10.70
Gary,Ind. U5	9.70	9.95
Pitts.,Calif. C11	10.45	10.70
Sp.Pt.,Md. B2	9.80	10.05
Weirton,W.Va. W6	9.70	9.95
Yorkville,O. W10	9.70	9.95

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$7.50
Dravosburg,Pa. U5	7.50
Fairfield,Ala. T2	7.60
Fairless,Pa. U5	7.60
Fontana,Calif. K1	8.25
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind. I-2, Y1	7.50
Niles,O. R2	7.50
Pittsburg,Calif. C11	8.25
SparrowsPoint,Md. B2	7.60
Weirton,W.Va. W6	7.50
Yorkville,O. W10	7.50

HOLLOWARE ENAMELING Black Plate (29 Gage)	
Aliquippa,Pa. J5	$7.15
Dravosburg,Pa. U5	7.15
Gary,Ind. U5	7.15
GraniteCity,Ill. G4	7.25
Ind.Harbor,Ind. Y1	7.15
Yorkville,O. W10	7.15

MANUFACTURING TERNES (Special Coated; Base Box)	
Dravosburg,Pa. U5	$9.20
Gary,Ind. U5	9.20

ROOFING SHORT TERNES (8 lb Coated; Base Box)	
Gary,Ind. U5	$10.75

WIRE

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.20
Aliquippa,Pa. J5	7.20
Alton,Ill. L1	7.40
Atlanta A11	7.40
Bartonville,Ill. K4	7.30
Buffalo W12	7.20
Chicago W13	7.20
Cleveland A7, C20	7.20
Crawfordsville,Ind. M8	7.30
Donora,Pa. A7	7.20
Duluth A7	7.20
Fairfield,Ala. T2	7.20
Fostoria,O.(24) S1	7.30
Houston S5	7.45
Jacksonville,Fla. M8	7.55
Johnstown,Pa. B2	7.20
Joliet,Ill. A7	7.20
KansasCity,Mo. S5	7.45
Kokomo,Ind. C16	7.30
LosAngeles B3	8.15
Minnequa,Colo. C10	7.45
Monessen,Pa. P7, P16	7.20
N.Tonawanda,N.Y. B11	7.20
Palmer,Mass. W12	7.50
Pittsburg,Calif. C11	8.15
Portsmouth,O. P12	7.20
Rankin,Pa. A7	7.20
S.Chicago,Ill. R2	7.20
S.SanFrancisco C10	8.15
SparrowsPoint,Md. B2	7.30
Sterling,Ill.(1) N15	7.20
Sterling,Ill. N15	7.30
Struthers,O. Y1	7.20
Waukegan,Ill. A7	7.20
Worcester,Mass. A7	7.50

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	11.75
Buffalo W12	11.75
Cleveland A7	11.75
Donora,Pa. A7	11.75
Duluth A7	11.75
Johnstown,Pa. B2	11.75
Minnequa,Colo. C10	11.875
Monessen,Pa. P16	11.75
Muncie,Ind. I-7	11.95
NewHaven,Conn. A7	12.05
Palmer,Mass. W12	12.05
Pittsburg,Calif. C11	12.55
Portsmouth,O. P12	11.75
Roebling,N.J. R5	12.05
SparrowsPt.,Md. B2	11.85
Struthers,O. Y1	11.75
Trenton,N.J. A7	12.05
Waukegan,Ill. A7	11.75
Worcester,Mass. A7	12.05

ROPE WIRE	(A)
Bartonville,Ill. K4	11.55
Buffalo W12	11.55
Fostoria,O. S1	11.55
Johnstown,Pa. B2	11.55
Monessen,Pa. P7, P16	11.55
Muncie,Ind. I-7	11.75
Palmer,Mass. W12	11.85
Portsmouth,O. P12	11.55
Roebling,N.J. R5	11.85
SparrowsPt.,Md. B2	11.65
Struthers,O. Y1	11.55
Worcester,Mass. J4	11.85
Niles,O. R2	7.50
Pittsburg,Calif. C11	8.25
SparrowsPoint,Md. B2	7.60
Weirton,W.Va. W6	7.50
Yorkville,O. W10	7.50

WIRE, Upholstery Spring

Aliquippa,Pa. J5	8.40
Alton,Ill. L1	8.60
Buffalo W12	8.40
Cleveland A7	*8.70*
Donora,Pa. A7	*8.70*
Duluth A7	*8.70*
Johnstown,Pa. B2	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.35
Minnequa,Colo. C10	8.60
Monessen,Pa. P7, P16	8.40
NewHaven,Conn. A7	*9.00*
Palmer,Mass. W12	8.70
Pittsburg,Calif. C11	9.35
Portsmouth,O. P12	8.40
Roebling,N.J. R5	8.70
S.Chicago,Ill. R2	8.40
S.SanFrancisco C10	9.35
SparrowsPoint,Md. B2	8.50
Struthers,O. Y1	8.40
Trenton,N.J. A7	*9.00*
Waukegan,Ill. A7	*8.70*
Worcester,Mass. A7	*9.00*

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	8.725
Alton,Ill. L1	8.925
Bartonville,Ill. K4	8.825
Buffalo W12	8.725
Cleveland A7	*9.025*
Donora,Pa. A7	*9.025*
Duluth A7	*9.025*
Fostoria,O. S1	8.775
Johnstown,Pa. B2	8.725
LosAngeles B3	9.675
Milbury,Mass.(12) N6	9.025
Minnequa,Colo. C10	8.975
Monessen,Pa. P7, P16	8.725
Muncie,Ind. I-7	8.925
Palmer,Mass. W12	9.025
Pittsburg,Calif. C11	9.675
Portsmouth,O. P12	8.725
Roebling,N.J. R5	9.025
S.Chicago,Ill. R2	8.725
S.SanFrancisco C10	9.675
SparrowsPt.,Md. B2	8.825
Struthers,O. Y1	8.725
Trenton,N.J. A7	*9.325*
Waukegan,Ill. A7	*9.025*
Worcester J4, T6	9.025
Worcester,Mass A7	*9.325*

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	14.35
Bartonville,Ill. K4	14.25
Buffalo W12	14.15
Chicago W13	14.15
Cleveland A7	14.15
Crawfordsville,Ind. M8	14.25
Fostoria,O. S1	14.15
Jacksonville,Fla. M8	14.50
Johnstown,Pa. B2	14.15
Kokomo,Ind. C16	14.15
Minnequa,Colo. C10	13.90
Monessen,Pa. P6	14.15
Muncie,Ind. I-7	14.35
Palmer,Mass. W12	14.45
Roebling,N.J. C10	14.45
S.SanFrancisco C10	14.50
Waukegan,Ill. A7	14.15
Worcester,Mass. A7, T6	14.45

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	15.25
Monessen,Pa. P16	15.45
Roebling,N.J. R5	15.60

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	10.75
Baltimore T6	11.05
Boston T6	11.05
Buffalo W12	10.75
Cleveland A7	10.75
Cra'fordsville,Ind. M8	10.75
Dover,O. G6	10.75
Fostoria,O. S1	10.75
FranklinPark,Ill. T6	10.85
Kokomo,Ind. C16	10.75
Massillon,O. R8	10.75
Milwaukee C23	10.95
Monessen,Pa. P7, P16	10.75
NewKensington,Pa. A6	10.75
Palmer,Mass. W12	11.05
Pawtucket,R.I. N8	11.05
Riverdale,Ill. A1	10.85
Rome,N.Y. R6	10.75
Trenton,N.J. R5	11.05
Worcester,Mass. A7, T6	11.05

NAILS & POLISHED STAPLES,

Stock	Col.
AlabamaCity,Ala. R2	164
Aliquippa,Pa. J5	164
Atlanta A11	166
Bartonville,Ill. K4	166
Crawfordsville,Ind. M8	166
Donora,Pa. A7	164
Duluth A7	164
Fairfield,Ala. T2	164
Houston,Tex. S5	169
Jack'ville,Fla. (20) M8	175
Johnstown,Pa. B2	164
Joliet,Ill. A7	164
KansasCity,Mo. S5	169
Kokomo,Ind. C16	166
Minnequa,Colo. C10	169
Monessen,Pa. P7	164
Pittsburg,Calif. C11	183
Rankin,Pa. A7	164
S.Chicago,Ill. R2	164
SparrowsPt.,Md. B2	166
Sterling,Ill. (1) N15	164
Worcester,Mass. A7	170

NAILS, Stock	Col.
Chicago W13	164
Cleveland A9	170

(To Wholesalers; per cwt)

Galveston,Tex. D7	$8.75

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	$9.53
Atlanta A11	9.63
Bartonville,Ill. K4	9.63
Buffalo W12	10.05
Chicago W13	9.53
Crawfordsville,Ind. M8	9.63
Donora,Pa. A7	9.53
Duluth A7	9.53
Fairfield,Ala. T2	9.53
Houston S5	9.78
Jack'ville,Fla. M8	10.09
Johnstown,Pa. B2	9.53
Joliet,Ill. A7	9.53
KansasCity,Mo. S5	9.78
Kokomo,Ind. C16	9.63
LosAngeles B3	10.32
Minnequa,Colo. C10	9.78
Pittsburg,Calif. C11	10.31
S.Chicago,Ill. R2	9.53
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.63
Sterling,Ill. (1) N15	9.53

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	$9.85
Atlanta A11	9.95
Bartonville,Ill. K4	9.95
Buffalo W12	10.35
Chicago W13	9.85
Crawfordsville,Ind. M8	9.95
Donora,Pa. A7	9.85
Duluth A7	9.85
Fairfield,Ala. T2	9.85
Houston S5	10.10
Jacksonville,Fla. M8	10.41
Johnstown,Pa. B2	9.85
Joliet,Ill. A7	9.85
KansasCity,Mo. S5	10.10
Kokomo,Ind. C16	9.95
LosAngeles B3	10.65
Minnequa,Colo. C10	10.10
Pittsburg,Calif. C11	10.65
S.Chicago,Ill. R2	9.85
S.SanFrancisco C10	10.65
SparrowsPt.,Md. B2	9.95
Sterling,Ill. (1) N15	9.85

Coil Interim	
AlabamaCity,Ala. R2	$9.90
Atlanta A11	10.00
Bartonville,Ill. K4	10.00
Buffalo W12	10.40
Chicago W13	9.90
Crawfordsville,Ind. M8	10.00
Donora,Pa. A7	9.90
Duluth A7	9.90
Fairfield,Ala. T2	9.91
Houston S5	10.15
Jacksonville,Fla. M8	10.46
Johnstown,Pa. B2	9.90
Joliet,Ill. A7	9.90
KansasCity,Mo. S5	10.15
LosAngeles B3	10.70
Minnequa,Colo. C10	10.15
Pittsburg,Calif. C11	10.70
S.Chicago,Ill. R2	9.90
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	10.00
Sterling,Ill. (1) N15	9.90

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	184**
Aliquippa,Pa. J5	181§
Atlanta A11	190*
Bartonville,Ill. K4	190
Crawfordsville,Ind. M8	190
Donora,Pa. A7	184†
Duluth A7	184†
Fairfield,Ala. T2	184†
Houston,Tex. S5	189**
Jacksonville,Fla. M8	195
Johnstown,Pa. B2	188*
Joliet,Ill. A7	184†
KansasCity,Mo. S5	189**
Kokomo,Ind. C16	186†
Minnequa,Colo. C10	189**
Monessen,Pa. P7	188*
Pittsburg,Calif. C11	204†
Rankin,Pa. A7	184†
S.Chicago,Ill. R2	184**
S.SanFrancisco C10	204**
SparrowsPoint,Md. B2	190*
Sterling,Ill. (1) N15	188*

WOVEN FENCE, 9-15 Ga.	Col.
Ala.City,Ala. R2	176**
Aliq'ppa,Pa. 9-14½ga. J5	179§
Atlanta A11	182*
Bartonville,Ill. K4	182
Crawfordsville,Ind. M8	182
Donora,Pa. A7	176†
Duluth A7	176†
Fairfield,Ala. T2	176†
Houston,Tex. S5	181**
Jacksonville,Fla. M8	187
Johnstown,Pa. (43) B2	180*
Joliet,Ill. A7	176†
KansasCity,Mo. S5	181**
Kokomo,Ind. C16	178†
Minnequa,Colo. C10	181**
Monessen,Pa. 9 ga. P7	180*
Pittsburg,Calif. C11	199†
Rankin,Pa. A7	176†
S.Chicago,Ill. R2	176**
Sterling,Ill. (1) N15	180*

	An'ld	Galv.
WIRE (16 gage)	Stone	Stone
Ala.City,Ala. R2	15.70	17.25**
Aliq'ppa,Pa. J5	15.70	17.50
Bartonville K4	15.80	17.75
Buffalo W12	16.10	....
Cleveland A7	15.70	....
Crawf'dsville M8	15.80	17.75
Fostoria,O. S1	16.20	17.75†
Houston S5	15.95	17.50**
Jacksonville M8	16.05	18.00
Johnstown B2	15.70	17.65*
Kan.City,Mo. S5	15.95	....
Kokomo C16	15.80	17.35†
Minnequa C10	16.05	17.75**
P'lm'r,Mass. W2	16.10	17.65*
Pitts.,Calif. C11	16.05	17.60†
SparrowsPt. B2	15.80	17.75*
Sterling(1) N15	16.10	18.05*
Waukegan A7	15.70	17.25†
Worcester A7	16.00	....

WIRE, Merchant Quality	An'ld	Galv.
(6 to 8 gage)	Stone	Stone
Ala.City,Ala. R2	7.95	8.35**
Aliquippa J5	7.95	8.475§
Atlanta (48) A11	8.05	8.65*
Bartonville(48) K4	8.05	8.65
Buffalo W12	8.10	8.50†
Cleveland A7	7.95	....
Crawfordsville M8	8.05	8.65
Donora,Pa. A7	7.95	8.35†
Duluth A7	7.95	8.35†
Fairfield T2	7.95	8.35†
Houston(48) S5	8.20	8.60**
Jacks'ville,Fla. M8	8.30	8.90
Johnstown B2(48)	7.95	8.55*
Joliet,Ill. A7	7.95	8.35†
Kans.City(48) S5	8.20	8.60**
Kokomo C16	8.05	8.45†
LosAngeles B3	8.90	9.50*
Minnequa C10	8.20	8.60**
Monessen P7 (48)	7.95	8.55*
Palmer,Mass. W12	8.40	8.80†
Pitts.,Calif. C11	8.90	9.30†
Portsmouth,O. P12	7.95	....
Rankin,Pa. A7	7.95	8.35†
S.Chicago R2	7.95	8.35**
S.SanFran. C10	8.90	9.30**
Spar'wsPt. B2(48)	8.05	8.65*
Sterling(1)(48) N15	7.95	8.55*
Struth'rs,O.(48) Y1	7.95	8.45‡
Worcester,Mass. A7	8.25	8.65†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††13c. **Subject to zinc equalization extras.

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	190
Atlanta A11	192
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	190
Duluth A7	190
Fairfield,Ala. T2	190
Houston S5	195
Jacksonville,Fla. M8	197
Joliet,Ill. A7	190
KansasCity,Mo. S5	195
Kokomo,Ind. C16	192
Minnequa,Colo. C10	195
Pitts.,Calif. C11	214
S.Chicago,Ill. R2	190
S.SanFrancisco C10	214
Sterling,Ill. N15	190
SparrowsPoint,Md. B2	192
Tonawanda,N.Y. B12	169
Williamsport,Pa. S19	175

FENCE POSTS

ChicagoHts.,Ill. C2, I-2	167
Duluth A7	167
Franklin,Pa. F5	167
Huntington,W.Va. W7	169
Johnstown,Pa. B2	167
Marion,O. P11	167
Minnequa,Colo. C10	172
Sterling,Ill. N15	167
Tonawanda,N.Y. B12	169
Williamsport,Pa. S19	175

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)
½ in. and smaller:
- 6 in. and shorter.. 55
- Longer than 6 in. .. 46.5

⅝ in. †thru 1 in.:
- 6 in. and shorter .. 46.5
- Longer than 6 in. .. 44

1⅛ in. and larger:
- All lengths 44

Undersized Body (rolled thread)
½ in. and smaller:
- 6 in. and shorter .. 55

Carriage, Machine, Lag Bolts Hot Galvanized:

½ in and smaller:
- 6 in. and shorter .. 35
- Longer than 6 in. .. 23

⅝ in. thru 1 in.:
- 6 in. and shorter .. 20
- Longer than 6 in. .. 20

1⅛ in. and larger:
- All lengths 20

Lag Bolts

All diameters:
- 6 in. and shorter 55
- Longer than 6 in. .. 47

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter 54

Larger than ½ in. or longer than 6 in. 47

Blank Bolts 47

Step, Elevator, Tire Bolts 54

NUTS

Reg. & Heavy Square Nuts:
All sizes 59

Square Nuts, Reg. & Heavy, Hot Galvanized:
All sizes 45

Hex Nuts, Reg. & Heavy, Hot Pressed:

¾ in. and smaller	63
⅞ in. to 1 in., incl.	59.5
1⅛ in. to 1½ in., incl.	64
1⅝ in. and larger	58

Hex Nuts, Reg. & Heavy, Cold Punched:

¾ in. and smaller	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger	58

Hex Nuts, All Types, Hot Galvanized:

¾ in. and smaller	50
⅞ in. to 1 in., incl.	46
1⅛ in. to 1½ in., incl.	51

Hex Nuts, Semifinished, Reg. & Heavy (Incl. Slotted):

¾ in. and smaller	63
⅞ in. to 1½ in., incl.	59.5
1⅝ in. and larger	58

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller	65
1⅛ in. to 1½ in., incl.	62
1⅝ in. and larger	58

CAP AND SET SCREWS
(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Cap Screws, Coarse or Fine Thread, Bright:

6 in. and shorter:
- ⅝ in. and smaller.. 47
- ¾, ⅞ and 1 in. diam. 31

Longer than 6 in.:
- ⅝ in. and smaller.. 18.5
- ¾, ⅞ and 1 in. diam. 5.5

High Carbon, Heat Treated:

6 in. and shorter:
- ⅝ in. and smaller.. 34
- ¾, ⅞ and 1 in. diam. 13

Longer than 6 in.:
- ⅝ in. and smaller. +1
- ¾, ⅞ and 1 in. diam. ..... +19

Fillister Head, Coarse Thread:
Listed Sizes ..... +31

Flat Head, Coarse Thread:
¼ in. and smaller by 6 in. and shorter.. +57

Set Screws, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:
- 6 in. and shorter .. 11
- Longer than 6 in. .. +10

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 10.85
$\frac{7}{16}$-in. under List less 26.5%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	23.56	22.84
1¼	13	....	27.92	22.68
1½	13	26.34	30.86	25.08
1¾	13	31.12	36.45	29.64
2	13	34.88	40.85	33.21
2¼	13	39.29	46.01	37.42
2¼	12	42.64	49.94	40.61
2½	12	46.98	55.01	44.73
2¾	12	50.86	59.57	48.44
3	12	54.24	63.53	51.66

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Standard All	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.075	4.975	5.025	6.00
Ensley,Ala. T2	5.075	4.975	....	6.00
Fairfield,Ala. T2	....	....	....	6.00
Gary,Ind. U5	5.075	4.975	5.025	....
Huntington,W.Va. C15	....	....	....	6.00
IndianaHarbor,Ind. I-2	5.075	4.975	5.025	....
Johnstown,Pa. B2	....	....	....(16)	6.00
Lackawanna,N.Y. B2	5.075	4.975	....	6.00
Minnequa,Colo. C10	5.075	4.975	....	6.50
Steelton,Pa. B2	5.075	4.975	....	....
Williamsport,Pa. S19	....	....	....	6.15

TIE PLATES

Fairfield,Ala. T2	6.025
Gary,Ind. U5	6.025
Ind.Harbor,Ind. I-2	6.025
Lackawanna,N.Y. B2	6.025
Minnequa,Colo. C10	6.025
Seattle B3	6.175
Steelton,Pa. B2	6.025
Torrance,Calif. C11	6.175

JOINT BARS

Bessemer,Pa. U5	6.35
Fairfield,Ala. T2	6.35
Ind.Harbor,Ind. I-2	6.35
Joliet,Ill. U5	6.35
Lackawanna,N.Y. B2	6.35
Minnequa,Colo. C10	6.35
Steelton,Pa. B2	6.35

AXLES

Ind.Harbor,Ind. S13	8.10
Johnstown,Pa. B2	8.10

TRACK BOLTS, Untreated

Cleveland R2	13.10
KansasCity,Mo. S5	13.10
Lebanon,Pa. B2	13.10
Minnequa,Colo. C10	13.10
Pittsburgh P14	13.10
Seattle B3	13.60

SCREW SPIKES

Cleveland R2	12.85
Pittsburgh P14	12.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	8.775
Ind.Harbor,Ind. I-2, Y1	8.775
KansasCity,Mo. S5	8.775
Lebanon,Pa. B2	8.775
Minnequa,Colo. C10	8.775
Pittsburgh J5	8.775
Seattle B3	9.275
S.Chicago,Ill. R2	8.775
Struthers,O. Y1	8.775
Youngstown R2	8.775

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 5/16 in.; 6.23c; 1 15/16 to 8 in.; inclusive, 6.60c.
(6) Chicago or Birm. base.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.685c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 7.30c, for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(48) 6-7 Ga. 8.65c, over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Ambridge, Pa. N2	+2	....	4.5	....	7	....	8.5	....	8.5	....	8.25	....	10.75	....
Lorain, O. N3	+5.75	+23.5	1.25	+17.5	3.75	+15	5.25	+13.5	5.25	+13.5	5	+13.75	7.5	+11.25
Youngstown Y1	+2.75	+20.75	1.25	+17.5	3.75	+15	5.25	+13.5	5.25	+13.5	5	+13.75	7.5	+11.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	5.75	23.5	1.25	17.5	3.75	15	5.25	13.5	5.25	13.5	5	13.75	7.5	11.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Alton, Ill. L1	....	....	....	....	....	....	10.5	+3.75	13.5	+4.75	16	+1.25	18.5	0.5
Benwood, W. Va. W10	10	+20.5	+0.25	+27.75	+9.75	+37.25	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Butler, Pa. F6	10	+20.5	0.5	+27	+8.5	+36	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Fairless, Pa. N3	....	....	....	....	....	....	7.25	+12	10.25	+8	13.75	+3.5	16.25	+1.75
Fontana, Calif. K1	....	....	....	....	....	....	+0.5	+19.75	2.5	+15.75	5	+12.5	7.5	+10.5
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	8.25	+11	11.25	+7	14.75	+2.5	17.25	+0.75
Lorain, O. N3	....	....	....	....	....	....	9.25	+10	12.25	+6	15.75	+1.5	18.25	0.25
Sharon, Pa. S4	11	+19.5	1.5	+26	+7.5	+35	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sparrows Pt., Md. B2	9	+21.5	0.5	+28	+9.5	+37	10.5	+8.75	13.5	+4.75	16	+1.25	18.5	0.5
Wheatland, Pa. W9	11	+19.5	1.5	+26	+7.5	+35	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Youngstown R2, Y1	....	....	....	....	....	....	9.25	+10	12.25	+6	15.75	+1.5	18.25	0.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Alton, Ill. L1	19	1.5	19.5	2	21	2.75	21	2.75	....	....	....	....
Benwood, W. Va. W10	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+0.75	13.5	+5.25
Etna, Pa. N2	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Fairless, Pa. N3	16.75	+0.75	17.25	+0.25	18.75	0.5	18.75	0.5	8.25	+10.5	8.25	+10.5
Fontana, Calif. K1	8	+9.5	8.5	+9	10	+8.25	10	+8.25	0.5	+18.25	0.5	+18.25
Indiana Harbor, Ind. Y1	17.75	0.25	18.25	0.75	19.75	1.5	19.25	1.5	9.25	+9.5	9.25	+9.5
Lorain, O. N3	18.75	1.25	19.25	1.75	20.75	2.5	20.75	2.5	....	....	....	....
Sharon, Pa. M6	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sparrows Pt., Md. B2	19	1.5	19.5	2	21	2.75	21	2.75	11	+7.25	11	+7.25
Wheatland, Pa. W9	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Younstown R2, Y1	18.75	1.25	19.25	1.75	20.75	2.5	20.75	2.5	10.25	+8.5	10.25	+8.5

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	21.25	26.00	....	34.50	....	....	....	46.75	43.25
202	22.75	29.00	35.00	37.50	39.25	41.25	43.25	47.25	47.25
301	22.25	27.00	35.75	35.75	40.25	42.50	44.50	49.25	45.75
302	24.25	30.25	36.50	39.00	41.00	43.25	45.50	50.00	50.00
302B	24.50	31.50	39.25	44.00	43.25	45.50	47.50	54.75	54.75
303	....	30.75	39.50	....	44.00	46.25	48.00	54.50	54.50
304	26.00	32.00	39.00	42.50	43.75	46.00	48.75	53.25	53.25
304L	....	....	46.50	49.50	51.25	53.50	56.25	60.75	60.75
305	27.50	35.25	40.75	45.75	43.75	46.00	49.25	56.50	56.50
308	29.50	36.75	45.50	48.25	50.75	53.50	58.00	60.50	60.50
309	38.25	47.50	55.50	62.00	61.25	64.50	68.25	77.50	77.50
310	47.75	59.25	75.00	81.00	83.25	87.50	89.25	93.00	93.00
314	....	....	....	....	83.25	....	80.25	....	100.50
316	38.25	47.50	59.75	66.50	66.75	70.25	73.75	78.25	78.25
316L	....	....	67.25	73.00	74.25	77.25	81.25	85.75	85.75
317	46.25	57.75	73.75	84.75	83.00	87.25	90.00	97.00	97.00
321	31.00	38.50	45.25	51.50	50.50	53.25	57.50	63.00	63.00
18-8 CbTa	35.50	44.75	53.50	61.00	59.25	62.25	67.00	76.25	76.25
403	....	....	30.75	....	34.50	36.25	38.75	46.50	46.50
405	18.75	24.50	28.50	34.50	32.50	34.00	36.00	45.00	45.00
410	16.00	20.75	27.25	29.75	31.00	32.50	33.75	38.75	38.75
416	....	....	27.75	....	31.50	33.00	34.75	46.50	46.50
420	....	32.25	33.00	40.25	37.75	39.75	43.50	59.50	59.50
430	16.25	21.00	27.75	30.75	31.50	33.00	34.50	39.25	39.25
430F	....	....	28.25	....	32.00	33.50	35.25	49.75	49.75
431	....	27.75	36.25	....	40.25	42.50	44.25	53.75	53.75
446	....	....	37.75	56.75	42.50	44.75	46.00	67.25	67.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U.S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U.S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	—Plates— 5%	Carbon Base 10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	35.50
304	33.15	36.20	40.30	44.50	37.75
304-L	35.40	38.80	43.15	47.65	....
316	38.35	41.60	45.90	50.15	55.50
316-L	43.55	47.60	52.70	57.85	....
316-Cb	43.85	48.10	53.40	58.75	....
321	34.90	37.95	42.10	46.40	44.75
347	37.05	41.25	46.45	51.70	54.25
405	27.55	29.20	33.15	37.05	....
410	27.00	28.70	32.65	36.55	....
430	27.00	28.70	32.65	36.55	....
Inconel	47.28	57.90	68.50	79.20	....
Nickel	40.00	50.30	60.65	71.05	....
Nickel, Low Carbon	40.30	50.95	61.65	72.50	....
Monel	41.70	51.90	62.15	72.40	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.50	40.85

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.290	Cr Hot Work	0.45-0.495
Extra Carbon	0.345	W-Cr Hot Work	0.043-0.475
Special Carbon	0.41-0.45	V-Cr Hot Work	0.460
Oil Hardening	0.450	Hi-Carbon-Cr	0.830

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.170
18.25	4.25	1	4.75	....	2.385
18	4	2	9	....	2.755
18	4	2	....	....	1.845
18	4	1	....	....	1.680
9	3.5	....	....	....	1.275
13.5	4	3	....	....	1.945
13.75	3.75	2	5	....	2.325
6.4	4.5	1.9	....	5	1.185
6	4	3	....	6	1.430
1.5	4	1	....	8.5	1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
AlabamaCity,Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	59.00‡	63.00	....
Woodward,Ala. W15	58.50**	59.00‡	63.00	....
Cincinnati, deld.	....	66.70	....	....
Buffalo District				
Buffalo H1, R2	62.50	63.00	63.50	64.00
Tonawanda,N.Y. W12	62.50	63.00	63.50	64.00
N.Tonawanda,N.Y. T9	....	63.00	63.50	64.00
Boston, deld.	73.79	74.29	74.79	....
Rochester,N.Y., deld.	65.52	66.02	66.52	....
Syracuse,N.Y., deld.	66.62	67.12	67.62	....
Chicago District				
Chicago I-3	62.50	63.00	63.00	63.50
Gary,Ind. U5	62.50	....	63.00	....
S.Chicago,Ill. R2	62.50	....	63.00	....
S.Chicago,Ill. Y1	62.50	63.00	63.00	....
S.Chicago,Ill. U5	62.50	....	63.00	63.50
S.Chicago,Ill. W14	62.50	....	63.00	63.50
Milwaukee, deld.	64.96	65.46	65.46	65.96
Muskegon,Mich., deld.	....	76.83	76.83	....
Cleveland District				
Cleveland R2, A7	62.50	63.00	63.00	63.50
Akron,O., deld.	*65.62*	*66.12*	*66.12*	*66.62*
Mid-Atlantic District				
Birdsboro,Pa. B10	64.50	65.00	65.50	66.00
Chester,Pa. P4	64.50	65.00	65.50	....
Philadelphia, deld.	66.26	66.76	67.26	....
Swedeland,Pa. A3	64.50	65.00	65.50	66.00
New York, deld.	....	71.20	71.70	....
Newark,N.J., deld.	68.52	69.02	69.52	70.02
Philadelphia, deld.	66.38	66.88	67.38	67.88
Troy,N.Y. R2	64.50	65.00	65.50	66.00
Pittsburgh District				
NevilleIsland,Pa. P6	62.50	63.00	63.00	63.50
Pittsburgh (N&S sides), Aliquippa, deld.	....	64.45	64.45	64.98
McKeesRocks,Pa., deld.	....	64.10	64.10	64.63
Lawrenceville, Homestead, Wilmerding, Monaca,Pa., deld.	....	64.76	64.76	65.29
Verona, Trafford,Pa., deld.	64.79	65.32	65.32	65.85
Brackenridge,Pa., deld.	65.10	65.60	65.60	66.13
Bessemer,Pa. U5	62.50	....	63.00	63.50
Clairton,Rankin,S.Duquesne,Pa. U5	62.50	....	....	....
Midland,Pa. C18	62.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	63.00	....
Sharpsville,Pa. S6	62.50	....	63.00	63.50
Youngstown Y1	....	....	63.00	63.50
Mansfield,O., deld.	67.40	....	67.90	68.40
Duluth I-3	62.50	63.00	63.00	63.50
Erie,Pa. I-3	62.50	63.00	63.00	63.50
Everett,Mass. E1	64.50	65.00	65.50	....
Fontana,Calif. K1	70.50	71.00	....	....
Geneva,Utah C11	62.50	63.00	....	....
GraniteCity,Ill. G4	64.40	64.90	65.40	....
Ironton,Utah C11	62.50	63.00	....	....
LoneStar,Tex. L6	58.50*	59.00†	....	....
Minnequa,Colo. C10	64.50	65.00	65.50	....
Rockwood,Tenn. T3	....	59.00‡	63.00	....
Toledo,O. I-3	62.50	63.00	63.00	63.50
Cincinnati, deld.	*69.04*	*69.54*	....	....

*Phos. 0.51-0.75%; Phos. 0.31-0.50%, $59.50.
**Phos. 0.70-0.90%; Phos. 0.30-0.60%, $59.50.
†Phos. 0.51-0.75%; Phos. 0.31-0.50%, $60.
‡Phos. 0.70-0.90%; Phos. 0.30-0.50%, $60.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. I-3, J1	71.50
Buffalo H1	72.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$105.50
NiagaraFalls,N.Y. P15	105.50
Keokuk,Iowa, Open-hearth & Fdry, freight allowed K2	110.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	113.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$76.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	76.50
Troy,N.Y. R2 (Phos. 0.035% max)	70.50
Philadelphia, deld.	78.26
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	67.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. Warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane San Francisco, 10 cents; Atlanta, Houston, Seattle no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Mer-chant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††‡		Carbon	Floor
Atlanta	8.17§	9.37§	9.83§	....	8.21	8.30	...	10.23	....	8.59	8.55	10.51
Baltimore	7.88	8.98	9.12	....	8.36	8.38	8.71	9.13[3]	14.68	8.75	8.26	9.76
Birmingham	7.80§	9.00§	9.52§	....	7.82	7.91	8.44	10.12	...	8.20	8.16	10.08
Boston	8.84	9.88	11.06	....	8.89	8.92	9.47	10.71	14.49	9.10	9.18	10.68
Buffalo	7.85	9.00	10.75	....	8.05	8.00	8.70	8.70	14.35	8.50	8.50	10.05
Chattanooga	8.00§	9.20§	9.10§	....	8.05	8.13	8.66	10.04	...	8.42	8.38	10.02
Chicago	7.80	9.00	9.70	....	7.82	7.91	8.44	8.35	13.95	8.20	8.16	9.49
Cincinnati	7.94	9.05	9.75	....	8.14	8.22	8.75	8.84	14.26	8.74	8.52	9.78
Cleveland	7.78	8.98	9.60	....	7.92	7.99	8.52	8.60	14.04	8.57	8.39	9.72
Denver	9.55	11.09	12.41	....	9.70	9.75	...	10.54	18.89	9.60	9.50	11.15
Detroit	8.03	9.25	10.05	....	8.17	8.21	8.74	8.68	14.21	8.74	8.51	9.74
Erie, Pa.	7.75	8.88	9.60[10]	....	7.90	8.00	8.65	8.70[10]	....	8.35	8.20	9.50
Houston	8.70	9.65	10.99	....	8.80	8.95	9.50	10.55	15.00	8.90	8.60	10.10
Jackson, Miss.	8.10§	9.30§	9.79§	....	8.15	8.23	8.76	10.23	...	8.52	8.48	10.11
Los Angeles	9.10	10.80	11.65	....	9.15	8.80	9.50	11.70	15.35	9.15	9.65	11.80
Milwaukee	7.93	9.13	9.83	....	7.95	8.04	8.57	8.58	14.08	8.41	8.29	9.62
Moline, Ill.	8.05	9.25	10.05	....	8.13	8.26	...	8.70	....	7.78	8.36	...
New York	8.45	9.66	10.23	60.20	8.90	8.86	9.41	10.65	14.39	8.91	9.01	10.31
Norfolk, Va.	8.05	...	...	....	8.55	8.60	...	10.80	....	8.95	8.45	9.95
Philadelphia	8.15	9.07	10.29	....	8.82	8.55	9.08	9.31	14.31	8.70	8.68	9.70
Pittsburgh	7.78	8.99	10.05	50.00	7.92	7.91	8.44	8.60	13.95	8.20	8.16	9.49
Portland, Oreg.	8.90	9.65	11.40	....	9.05	8.95	...	13.55	14.60	8.90	8.70	11.60
Richmond, Va.	8.00	...	10.14	....	8.55	8.92	9.20	10.00	....	8.95	8.40	9.90
St. Louis	8.14	9.34	10.06	....	8.19	8.28	8.81	8.96	14.31	8.67	8.52	9.86
St. Paul	8.29	9.49	10.31	....	8.43	8.52	...	9.21	....	8.94	8.90	9.87
San Francisco	8.95	10.30	10.80	....	8.95	8.80	9.35	12.30	15.35	9.05	9.20	11.45
Seattle	9.55	10.70	11.65	....	9.55	9.30	9.85	13.30	15.65	9.35	9.30	11.40
Spokane, Wash.	9.55	10.70	11.65	....	9.55	9.30	9.85	13.30	16.40	9.35	9.30	11.40
Washington	8.48	9.58	...	....	9.06	8.98	...	9.73	....	9.35	8.86	10.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; **⅛-in. and heavier; ††as annealed; §42 in. and under.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—400 to 999 lb; [8]—1000 to 1999 lb; [9]—2000 to 3999 lb; [10]—2000 lb and over.

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Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beach Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $128; Salina, Pa., $133; Niles, O., $138; Cutler, Utah, $148.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $165; Stevens Pottery, Ga., $175.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $140; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $145; E. Chicago, Ind., Joliet, Rockdale, Ill., $150; Lehigh, Utah, $165; Los Angeles, $170.

Super-Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Latrobe, Pa., $160; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $145; Woodbridge, N. J., $128; Philadelphia, $130.

Ladle Brick (per 1000)

Dry Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $220; Danville, Ill., $223; Philadelphia, Clearfield, Pa., $230.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $275; Danville, Ill., $278; Philadelphia, Clearfield, Pa., $285.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $315; Danville, Ill., $318; Philadelphia, Clearfield, Pa., $325.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $177; Clearfield, Pa., $189.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $292; Clearfield, Pa., $311.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $221; Clearfield, Pa., $236.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $16; Thornton, McCook, Ill., $16.35; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ¼-in. grains with fines: Chewelah, Wash., Luning, Nev. $43; ⅜-in. grains with fines: Baltimore, $69.40.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-39; 70%, $35-36; 60%, $31-32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge iron:	
Swedish, c.l.f. Camden, N.J., c.l. in bags	8.50
Domestic:	
F.o.b., Johnstown, Pa., Niagara Falls, N. Y., in bags	9.50
F.o.b., Riverton, N. J., in bags	8.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	26.00
Annealed, 99.5% Fe	36.50
Unannealed (99+ % Fe)	34.00
Unannealed (99+ % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)	29.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum, frght allowed	
Carlots	36.20
Ton lots	37.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	36.80-46.80†
Bronze, 5000-lb lots	56.20-60.00†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.05
Nickel-Silver, 5000-lb lots	56.10-60.10†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	48.50-56.00‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.05
Stainless Steel, 316	$1.40
Tin	14.50*
Zinc, 5000-lb lots	19.75-33.00‡
Tungsten:	Dollars
Melting grade, 99%	
60 to 2000 mesh:	
1000 lb and over	4.20
Less than 1000 lb.	4.35
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam.	Inches Length	Per 100 lb
2	24	$57.75
2½	30	37.25
3	40	35.25
4	40	33.25
5½	40	33.00
6	60	30.00
7	60	26.75
8, 9, 10	60	26.50
12	72	25.50
14	60	25.50
16	72	24.50
17	60	25.50
18	72	24.50
20	72	24.00
24	84	24.75

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$7.15	$7.15	$7.15	$7.40
Bar Size Angles	7.11	7.11	7.11	7.26
Structural Angles	7.30	7.30	7.30	7.50
I-Beams	7.75	7.75	7.75	8.15
Plates (basic bessemer)	9.30	9.30	9.30	9.70
Sheets, H.R.	8.55	8.55	8.55	8.85
Sheets, C.R. (drawing quality)	8.95	8.95	8.95	9.35
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	27.17	27.17	27.17	27.64
Barbed Wire (†)	6.80	6.80	6.80	7.25
Merchant Bars	7.15	7.15	7.15	7.50
Hot-Rolled Bands	7.25	7.25	7.25	7.65
Wire Rods, Thomas Commercial No. 5	6.38	6.38	6.38	6.78
Wire Rods, O-H Cold Heading Quality No. 5	6.72	6.72	6.72	7.12
Bright Common Wire Nails (‡)	8.45	8.45	8.45	8.87
Oil Country Pipe: Mills withdrawn temporarily.				

†Per 82-lb. net, reel. ‡Per 100-lb kegs, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross tons, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old range bessemer	11.85
Old range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom. 24.00-25.00
Brazilian iron ore, 68-69%	35.00-36.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$27.00-28.00
Domestic, concentrates, mine	55.00

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.60-1.70 per long ton unit, c.i.f. U.S. ports, duty for buyer's account; other than Indian, $1.45-1.50; contracts by negtiation.

Chrome Ore

Gross ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$54.00-57.00
48% 2.8:1	51.00-54.00
48% no ratio	43.00-45.00

South African Transvaal

48% no ratio	$37.50-39.00
44% no ratio	26.00-27.00

Turkish

48% 3:1	$60.00-63.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.20-3.65
60-65%	3.65-3.75

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	*$14.75-15.75*
Connellsville, foundry	17.50-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	33.78
Buffalo, ovens	30.50
Camden, N. J. ovens	29.50
Detroit, ovens	30.50
Pontiac, deld.	32.25
Saginaw, deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens	
New England, deld	31.55*
Indianapolis, ovens	29.75
Ironton, O., ovens	29.00
Cincinnati, deld.	29.27
Kearny, N.J., ovens	30.00
Lone Star, Tex., ovens	25.50
Milwaukee, ovens	30.50
Painesville, O., ovens	30.50
Cleveland, deld.	*32.69*
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
Neville Island (Pittsburgh), Pa., ovens	29.25
St. Paul, ovens	29.75
Chicago, deld.	33.14
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

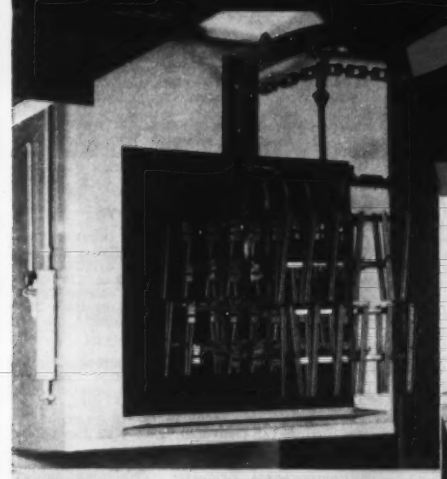
Ammonium sulfate	$32.00

Cents per pound, producing point

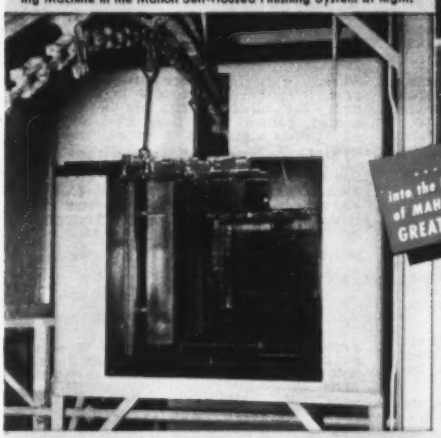
Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

COMPLETE *Finishing* SYSTEMS

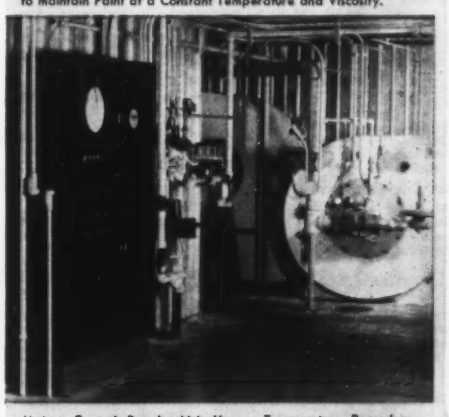
. . . for ENAMELS • LACQUER • PAINT • VARNISH



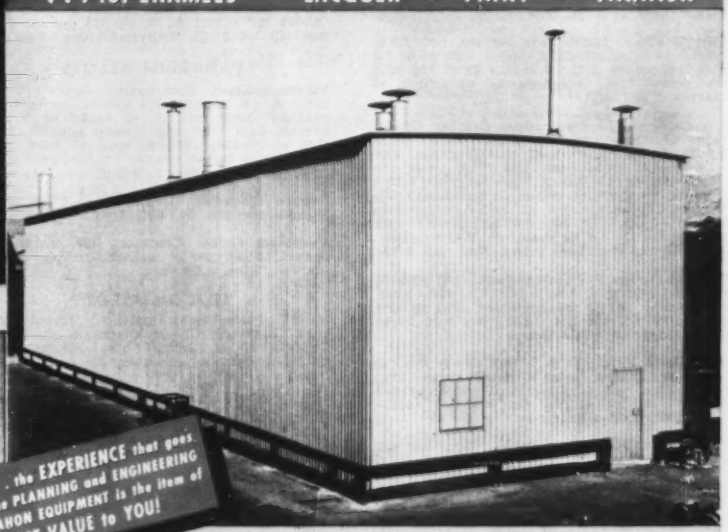
Truck Parts Entering Five-Stage Metal Cleaning and Rust Proofing Machine in the Mahon Self-Housed Finishing System at Right.



Entrance End of the Mahon Flow Coater. Equipment is provided to maintain Paint at a Constant Temperature and Viscosity.



Mahon Control Panel which Houses Temperature Recorders, Control Switches, Signal Lights and Automatic Safety Devices.



. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Complete Mahon Self-Housed Finishing System Installed Adjacent to Manufacturing Buildings at International Harvester Company's Plant, Fort Wayne, Indiana.

SELF-HOUSED Mahon Finishing System OUTSIDE of PLANT Solves Many SPACE PROBLEMS!

In industrial plants where adequate space is not available, or where floor space and headroom restrictions would seriously interfere with the planning and the engineering of an efficient and economical production finishing system, Mahon engineers recommend installation of a Self-Housed Finishing System on the roof of the plant, or outside the plant adjacent to manufacturing buildings . . . the installation illustrated above is an excellent example. In such installations, no restrictions are imposed by either floor space or headroom; consequently equipment can be planned and coordinated for maximum efficiency. In this particular finishing system, the equipment is installed on two levels . . . the Five-Stage Metal Cleaning and Rust Proofing Machine, the Flow Coater, the Ventilated Drip Enclosure, and the Control Panel with Recording Instruments, are located on the ground level. The Dry-Off Oven, Finish Baking Oven Oven Heating Units, and Air Supply and Exhaust Equipment are located above on the second level. The roof and walls, which house the complete system, are an integral part of the Oven Construction. This is a highly satisfactory Mahon solution of one manufacturer's production painting problem. When you are confronted with a finishing problem, you, too, will want to discuss it with Mahon engineers . . . you'll find them better qualified to advise you on both methods and equipment requirements. See Sweet's Plant Engineering File for Information, and typical Mahon Installations, or write for Catalog A-657.

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SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton: $255, Johnstown, Duquesne, Sheridan, Pa., Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices, Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 33c; 2000 lb to min carload, 35c; 500 lb to 1999 lb, 37c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 13.8c per lb of alloy. Packed, c.l. 15c, ton 15.45c, less ton 16.45c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk, 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c, 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 29.05c per lb contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8 M x D, 20.85c, per lb of alloy, ton lot 22.10c; less ton lot 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ¼" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.29 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13.9c per lb of contained Si. Packed c.l. 16.4c, ton lot 17.85c, less ton 19.5c, f.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per pound contained silicon. Packed, c.l. 17.25c, ton lot, 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5%-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing 2 lb of Cr). Contract, carload, bulk, 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 20.4c; 2000 lb to c.l. in bags, 21.3c; less than 2000 lb in bags 22.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l. bags, 17.2c, less ton 18.1c. Delivered. Add 0.25 for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 00.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk, 7.7c per lb of briquet, packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c. (Small size—weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l. bags 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $3.15 per lb of contained W; 2000 lb W to 5000 lb W, $3.25; less than 2000 lb W, $3.37. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.95 per lb of contained Cb plus Ta, delivered; less ton lot $5.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, c.l. packed ½-in. x 12 M 19c per lb of alloy, ton lot 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5.7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

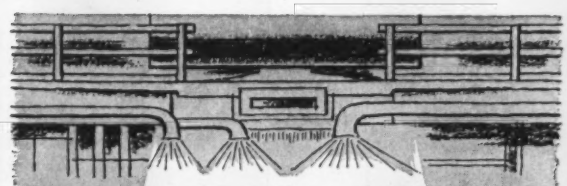
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.



ROLLING MILLS

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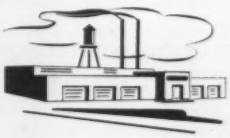

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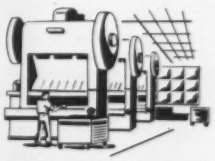

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UTICA 1, NEW YORK

Scrap Price Softness Continues

Market still headed downward, but the pace of the decline has slackened noticeably. Trade watching developments in steel market for clue to future trend

Scrap Prices, Page 250

Chicago — Readjustments in scrap prices are continuing. The latest amounts to $7 in the case of rerolling rails, $5 for No. 1 dealer bundles, $4 for No. 1 heavy melting steel and $3 for No. 1 railroad heavy melting.

For other grades, such as No. 2 heavy melting, No. 1 factory bundles and No. 2 bundles, the sell-off in mill purchases was only $1 a ton, but some of these grades had dropped previously.

Philadelphia—Market sentiment is easy. In the absence of important buying, prices on the major open-hearth scrap grades are off nominally $1 a ton. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are $58, delivered; No. 2 heavy melting, $49; and No. 2 bundles, $57.50. Low phos structurals and plate are offered at $62-$63, delivered, off $1. Couplers, springs and wheels are $70, down $3. Other steel items are unchanged.

No. 1 cupola has declined to $51-$53, delivered; heavy breakable cast to $57-$59; and drop broken machinery to $58-$59. Malleable is nominally lower at $66.

New York—Brokers have reduced prices on most grades of scrap reflecting slower consuming demand. They are offering $53-$54 for No. 1 heavy melting and No. 1 bundles; $45-$46 for No. 2 heavy melting; $43-$44 for No. 2 bundles. These reductions range from $1 to $2 a ton.

Machine shop turnings, mixed borings and turnings and short shoveling turnings have been reduced $1 a ton. Low phos is unchanged. In the cast iron grades, No. 1 cupola is off $1 to $45-$46, unstripped motor blocks, $1 to $37-$38, and heavy breakable, $2.50 to $48-$49.

Stainless steel scrap prices are easier, with the straight chrome grades off $5 a ton. Type 430 sheets, clips and solids are $105-$110, and type 410 material $95-$100. The nickel bearing grades are nominally unchanged, but the market tone is weaker.

Boston—Brokers have dropped their buying prices for No. 2 heavy melting and bundles $1.50 a ton. Prices on other steel grades are inclined to wobble. Buying by district consumers and for export is lower this month.

Pittsburgh — Scrap prices are still falling, and there is a possibility of further declines. Material will be freely available in the second quarter due to better weather. The steel operating rate

famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

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also may be lower than it was in the first quarter.

Weakness continues in all grades except turnings, borings and stainless steel scrap. Price declines were generally no more than $1 the past week. A major mill bought No. 1 heavy melting for $54, off $1. No. 2 heavy melting also declined $1, but No. 2 bundles sold for $43, off $2.

Cleveland—With all leading consuming mills here and in the Valley holding out of the market, scrap prices are unchanged but are nominal. Not much in the way of activity is expected before the end of the month when the new auto lists will come out. Mill stocks are substantial. Dealer stocks are not heavy.

Youngstown—Youngstown Sheet & Tube Co. bought No. 1 heavy melting steel at $54, and No. 2 bundles at $53. These prices represent a drop of $12 to $14 a ton from the prices paid late in 1956. Another area mill bought No. 2 heavy melting at $50 and No. 2 bundles at $45, off $7 from its last purchase.

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Cincinnati — Limited local area mill purchases established a lower market in scrap last week. No. 1 heavy melting is off $2.50 to $48.50-$49.50, broker's buying price.

Buffalo—Railroad and cast iron grades are off $2 to $4 a ton in this market. Scrap rails dropped to $65, down $4, while railroad specialties fell to $58, down $2. Cupola cast is quoted $2 lower at $48, while No. 1 machinery cast is down $1 to $54. Short shoveling turnings and low phos scrap also are quoted at lower levels.

Detroit—Scrap prices are firm here. It's possible that there may be a $1 or $2 per ton increase on the No. 1 grades by the end of this month. Apparently, the market slide has been firmed locally by some buying for Hamilton, Ont., mills. This scrap is awaiting early opening of lake shipping.

Birmingham—The scrap market is weak. An Atlanta mill bought No. 2 heavy melting last week at $44, delivered, off $4 a ton from its last purchase. Railroad specialties continue to slide. Most other grades also are easier.

St. Louis—Brokers here are offering $1 to $6 per ton less for scrap. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are at $46.50, off $2.50. Rerolling rails, 18 in. and under, at $70 are off $6 a ton. Thin demand continues. Mills hold substantial stockpiles despite near-capacity operations.

San Francisco — Steel scrap prices have stabilized at the recently established lower levels. Collections are being stimulated by continued good weather.

Los Angeles—The market undertone is soft, with further price declines indicated.

Seattle — Scrap is weak here, with indications of further price concessions. Last week, No. 1 heavy melting dropped to $53, No. 2 to $51. Mills hold large inventories, and foreign buyers are holding out of the market because of current price easiness.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 244

Demand continues firm for Connellsville beehive coke. Prices of beehive furnace coke edged up

(*Please turn to page* 255)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Feb. 13	$53.17
Feb. 6	55.17
Jan. Avg.	58.96
Feb. 1956	48.96
Feb. 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*53.00-54.00*
No. 2 heavy melting	*47.00-48.00*
No. 1 bundles	*53.00-54.00*
No. 2 bundles	*42.00-43.00*
No. 1 busheling	*53.00-54.00*
Machine shop turnings	38.00-39.00
Mixed borings, turnings	38.00-39.00
Short shovel turnings	42.00-43.00
Cast iron borings	42.00-43.00
Cut structurals, 3 ft. lengths	*58.00-59.00*
Cut structurals, 2 ft. and under	*60.00-61.00*
Heavy turnings	49.00-50.00
Punchings & plate scrap	*58.00-59.00*
Electric furnace bundles	*58.00-59.00*

Cast Iron Grades

No. 1 cupola	*51.00-52.00*
Heavy breakable cast	*49.00-50.00*
Unstripped motor blocks	*39.00-40.00*
No. 1 machinery cast	*59.00-60.00*

Railroad Scrap

No. 1 R.R. heavy melt	56.00-57.00
Rails, 2 ft and under	*70.00-71.00*
Rails, 18 in. and under	*71.00-72.00*
Rails, random lengths	*67.00-68.00*
Railroad specialties	*66.00-67.00*

Stainless Steel Scrap

18-8 bundles & solids	500.00-540.00
18-8 turnings	420.00-440.00
430 bundles & solids	110.00-120.00
430 turnings	80.00-85.00

CLEVELAND

No. 1 heavy melting	51.00-52.00
No. 2 heavy melting	46.00-47.00
No. 1 bundles	51.00-52.00
No. 2 bundles	*38.00-39.00*
No. 1 busheling	51.00-52.00
Machine shop turnings	33.00-34.00
Mixed borings, turnings	35.00-36.00
Short shovel turnings	35.00-36.00
Cast iron borings	35.00-36.00
Cut foundry steel	54.00-55.00
Cut structurals plates 2 ft and under	59.00-60.00
Alloy free, short shovel turnings	*39.00-40.00*
Electric furnace bundles	*52.00-53.00*

Cast Iron Grades

No. 1 cupola	53.00-54.00
Charging box cast	42.00-43.00
Heavy breakable cast	42.00-43.00
Stove plate	49.00-50.00
Unstripped motor blocks	35.00-36.00
Brake shoes	42.00-43.00
Clean auto cast	52.00-53.00
Burnt cast	40.00-41.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt	53.00-54.00
R.R. malleable	61.00-62.00
Rails, 2 ft and under	76.00-77.00
Rails, 18 in. and under	77.00-78.00
Rails, random lengths	71.00-72.00
Cast steel	64.00-65.00
Railroad specialties	67.00-68.00
Uncut tires	66.00-67.00
Angles, splice bars	66.00-67.00
Rails, rerolling	75.00-76.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*450.00-475.00*
18-8 turnings	*290.00-300.00*
430 clips, bundles, solids	*95.00-100.00*
430 turnings	*40.00-45.00*

YOUNGSTOWN

No. 1 heavy melting	53.00-54.00
No. 2 heavy melting	49.00-50.00
No. 1 bundles	53.00-54.00
No. 2 bundles	*41.00-42.00*
No. 1 busheling	53.00-54.00
Machine shop turnings	34.00-35.00
Short shovel turnings	38.00-39.00
Cast iron borings	38.00-39.00
Low phos.	54.00-55.00
Electric furnace bundles	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	55.00-56.00

CHICAGO

No. 1 hvy melt, indus.	*49.00-50.00*
No. 1 hvy melt, dealer	*46.00-47.00*
No. 2 heavy melting	*42.00-43.00*
No. 1 factory bundles	*53.00-54.00*
No. 1 dealer bundles	*46.00-47.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling, indus.	*49.00-50.00*
No. 1 busheling, dealer	*46.00-47.00*
Machine shop turnings	34.00-35.00
Mixed borings, turnings	36.00-37.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Cut structurals, 3 ft	*56.00-57.00*
Punchings & plate scrap	*57.00-58.00*

Cast Iron Grades

No. 1 cupola	*45.00-46.00*
Stove plate	*41.00-42.00*
Unstripped motor blocks	34.00-35.00
Clean auto cast	*50.00-51.00*
Drop broken machinery	*50.00-51.00*

Railroad Scrap

No. 1 R.R. heavy melt	*53.00-54.00*
R.R. malleable	60.00-61.00
Rails, 2 ft and under	*69.00-70.00*
Rails, 18 in. and under	*70.00-71.00*
Angles, splice bars	*60.00-61.00*
Rails, rerolling	*64.00-65.00*

Stainless Steel Scrap

18-8 bundles & solids	510.00-525.00
18-8 turnings	355.00-375.00
430 bundles & solids	105.00-110.00
430 turnings	65.00-70.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	43.00-44.00
No. 2 bundles	*33.00-34.00*
No. 1 busheling	43.00-44.00
Machine shop turnings	27.00-29.00
Mixed borings, turnings	28.00-30.00
Short shovel turnings	29.00-30.00
Punchings & plate scrap	56.00-57.00

Cast Iron Grades

No. 1 cupola	51.00
Charging box cast	44.00
Stove plate	45.00
Heavy breakable	44.00
Unstripped motor blocks	32.00
Clean auto cast	55.00
Malleable	56.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*46.50*
No. 2 heavy melting	*43.00*
No. 1 bundles	*46.50*
No. 2 bundles	*38.00*
No. 1 busheling	*46.50*
Machine shop turnings	*34.50*
Short shovel turnings	*36.50*

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	40.00
Unstripped motor blocks	40.00
Brake shoes	*50.00*
Clean auto cast	50.50
Stove plate	41.00

Railroad Scrap

No. 1 R.R. heavy melt.	*54.00*
Rails, 18 in. and under	*70.00*
Rails, rerolling	*70.00†*
Rails, random lengths	*64.00*
Angles, splice bars	*65.00*

†Nominal.

PHILADELPHIA

No. 1 heavy melting	*58.00†*
No. 2 heavy melting	*49.00†*
No. 1 bundles	*58.00†*
No. 2 bundles	*47.50†*
No. 1 busheling	*58.00†*
Electric furnace bundles	61.00
Mixed borings, turnings	44.00
Machine shop turnings	42.00-43.00
Short shovel turnings	46.00-47.00
Heavy turnings	54.00
Structurals & plates	*62.00-63.00*
Couplers, springs, wheels	*70.00*
Rails, crops, 2 ft & under	80.00-82.00

Cast Iron Grades

No. 1 cupola	*51.00-53.00*
Heavy breakable cast	*57.00-59.00*
Malleable	*66.00†*
Drop broken machinery	*58.00-59.00*

†Nominal.

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*53.00-54.00*
No. 2 heavy melting	*45.00-46.00*
No. 1 bundles	*53.00-54.00*
No. 2 bundles	*43.00-44.00*
Machine shop turnings	33.00-34.00
Mixed borings, turnings	*34.00-35.00*
Short shovel turnings	*37.00-39.00*
Low phos. (structural & plate	58.00-59.00

Cast Iron Grades

No. 1 cupola	*45.00-46.00*
Unstripped motor blocks	*37.00-38.00*
Heavy breakable	*48.00-49.00*

Stainless Steel

18-8 sheets, clips solids	475.00-485.00
18-8 borings, turnings	345.00-370.00
430 sheets, clips, solids	*105.00-110.00*
410 sheets, clips, solids	*95.00-100.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	48.00-48.50
No. 2 heavy melting	*37.00-38.00*
No. 1 bundles	48.00-48.50
No. 2 bundles	*36.00-37.00*
No. 1 busheling	48.00-48.50
Machine shop turnings	30.00-31.00
Mixed borings, turnings	31.00-32.00
Short shovel turnings	34.00-35.00
No. 1 cast	44.00-45.00
Mixed cupola cast	42.00-43.00
No. 1 machinery cast	44.00-45.00

BUFFALO

No. 1 heavy melting	53.00-54.00
No. 2 heavy melting	46.00-47.00
No. 1 bundles	53.00-54.00
No. 2 bundles	42.00-43.00
No. 1 busheling	53.00-54.00
Mixed borings, turnings	36.00-37.00
Machine shop turnings	33.00-34.00
Short shovel turnings	37.00-38.00
Cast iron borings	36.00-37.00
Low phos.	*58.00-59.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*47.00-48.00*
No. 1 machinery	*53.00-54.00*

Railroad Scrap

Rails, random lengths	*64.00-65.00*
Rails, 3 ft and under	*69.00-70.00*
Railroad specialties	*57.00-58.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*48.50-49.50*
No. 2 heavy melting	*41.00-42.00*
No. 1 bundles	*48.50-49.50*
No. 2 bundles	*36.50-37.50*
No. 1 busheling	*48.50-49.50*
Machine shop turnings	34.00-35.00
Mixed borings, turnings	34.00-35.00
Short shovel turnings	36.00-37.00
Cast iron borings	33.50-34.50
Low phos.18 in.	*55.00-56.00*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Heavy breakable cast	44.00-45.00
Charging box cast	44.00-45.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	*52.00-53.00*
Rails, 18 in. and under	73.00-74.00
Rails, random lengths	63.00-64.00

BIRMINGHAM

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	*40.00-41.00*
No. 1 bundles	44.00-45.00
No. 2 bundles	*31.00-32.00*
No. 1 busheling	44.00-45.00
Cast iron borings	27.00-28.00
Short shovel turning	35.00-36.00
Machine shop turing	34.00-35.00
Bar crops and plate	*55.00-56.00*
Structural & plate, 2 ft	*54.00-55.00*
Electric furnace bundles	*50.00-51.00*
Electric furnace, 2 ft & under	*48.00-49.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	53.00-54.00
Stove plate	51.00-52.00
Unstripped motor blocks	*42.00-43.00*
Charging box cast	40.00-41.00
No. 1 wheels	*42.00-43.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*50.00-51.00*
Rails, 18-in. and under	66.00-67.00
Rails, rerolling	*65.00-66.00*
Rails, random lengths	*61.00-62.00*
Angles, splice bars	*60.00-61.00*

SEATTLE

No. 1 heavy melting	*53.00*
No. 2 heavy melting	51.00
No. 1 bundles	51.00
No. 2 bundles	31.00-34.00
Machine shop turnings	30.00-33.00
Mixed borings, turnings	30.00-33.00
Electric furnace No. 1	62.00-65.00

Cast Iron Grades

No. 1 cupola	54.00-56.00
Heavy breakable cast	48.00-50.00
Unstripped motor blocks	45.00-47.00
Stove plate (f.o.b. plant)	42.00-43.00

LOS ANGELES

No. 1 heavy melting	59.00
No. 2 heavy melting	57.00
No. 1 bundles	58.00
No. 2 bundles	40.00
Machine shop turnings	38.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	60.00

SAN FRANCISCO

No. 1 heavy melting	55.00
No. 2 heavy melting	50.00
No. 1 bundles	54.00
No. 2 bundles	38.00
Machine shop turnings	35.00
Mixed borings, turnings	35.00
Cast iron borings	35.00
Heavy turnings	35.00
Short shovel turnings	37.00
Cut structurals, 3 ft	63.00

Cast Iron Grades

No. 1 cupola	60.00
Charging box cast	47.00-49.00
Stove plate	48.00
Heavy breakable cast	42.00
Unstripped motor blocks	50.00
Clean auto cast	60.00
No. 1 wheels	50.00
Drop broken machinery	62.00

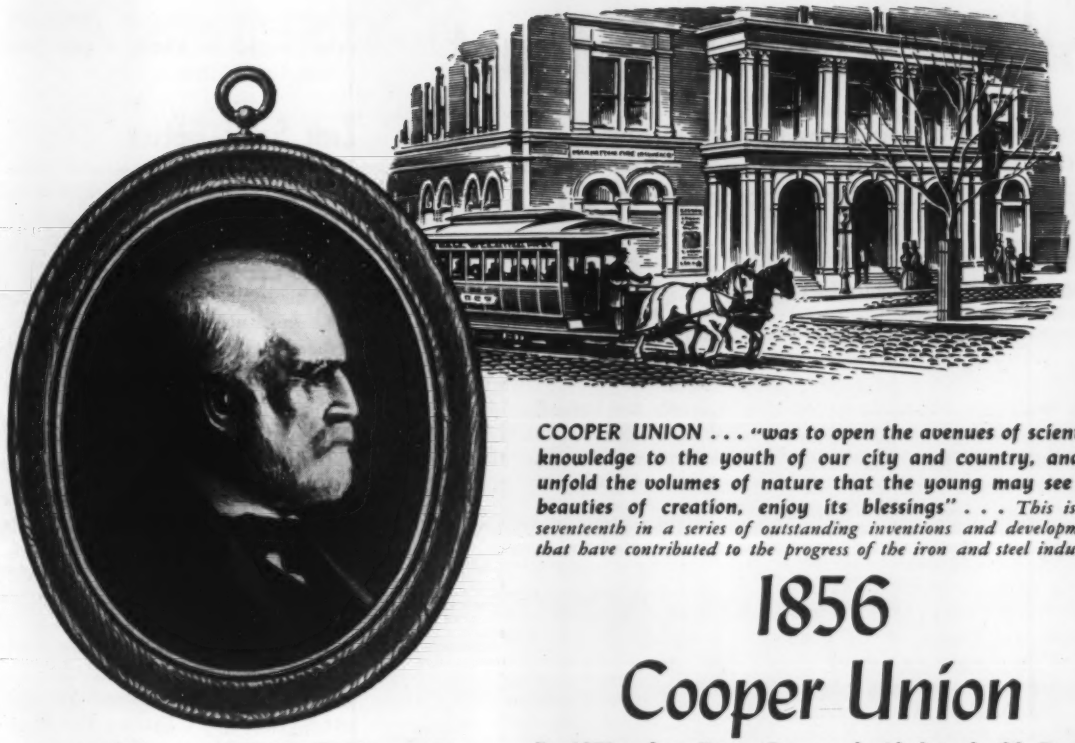
HAMILTON, ONT.

No. 1 heavy melting	50.00
No. 2 heavy melting	44.00
No. 1 bundles	50.00
No. 2 bundles	38.00
Mixed steel scrap	42.00
Busheling, new factory: Prepared	48.00
Unprepared	44.00
Short steel turnings	31.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b., Hamilton, Ont.



Abram S. Hewitt

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Cooper Union

In 1852, when Peter Cooper decided to build Cooper Union, he envisioned a monumental structure of six stories that would be spacious, handsome and enduring.

He consulted his partner in the Trenton Iron Works, Abram S. Hewitt, on the possibility of using wrought iron beams in the new building. Hewitt began experiments based upon rail making, with an objective of producing beams about 7 inches deep. New machinery was devised, for none existed which would roll flanged beams 7 inches in a horizontal section. The result was the first "universal mill", which in the words of Hewitt, was a "3 high mill placed vertically instead of horizontally. Additional horizontal rolls were provided to operate where the vertical rolls came together at the top". Later, the machinery produced heavier rails and structural beams rolled 25 feet in length and 7 inches deep.

Through the years, engineering skill improved the process to meet modern industrial demands. Keeping pace with this technological progress is the development in the fields requiring special steels.

These special steels require special scrap of known analysis, a problem particularly suited to our experience, personnel, equipment, and the strategic location of our offices. Possibly our facilities may help you solve a problem in iron or steel scrap.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Stockpile Problems Mount

Congress will want to know how important it is to continue extensive defense stockpiling of nonferrous metals. To find answers, each metal will have to be analyzed

Nonferrous Metal Prices, Pages 254 & 255

CONGRESSMEN, intent on slashing the budget, will give the metal stockpiling program a thorough going over during the first half of 1957.

Lead, Zinc—The defense stockpiling program (set up by the Defense Production Act) has about reached its quota, but a supplementary plan for both metals could go on indefinitely if Congress is willing to appropriate funds. While there may be reluctance to do so, look for mine state representatives and senators to push hard for the necessary money.

Tungsten — It's already having tough sledding in Appropriation Committee hearings. Most congressmen feel that enough tungsten mines have been developed in this country to meet defense needs.

Copper—Funds are available to have the General Services Administration purchase additional quantities of the red metal for defense stockpile requirements. GSA might enter the market at about the 30 cent a pound mark. The problem: Federal agencies must decide if supply will continue to be greater than demand.

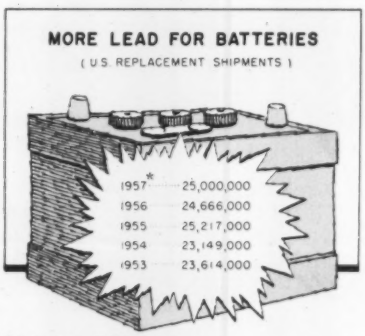
Nickel—The problem will not be funds, but how much nickel should be stockpiled. With expansion plans under way, nickel producers and users feel that perhaps the government could revise its stockpile goals downward.

Aluminum — Stockpile quotas have been reached but the U.S. is committed to buy any aluminum which cannot be sold for military or civilian needs from facilities which were built to satisfy defense requirements.

Further Price Decline?

Pressure is building for another slash in copper prices (see page 118). If it develops, the cut could be from the present primary price of 34 cents a pound to about 30 cents. Producers' stocks are building up rapidly, and the recent drop from 36 cents has had little effect on sales.

Layoffs are becoming more common as brass mills cut back to four and four and one-half day weeks.



* Estimated by STEEL.
Source: Dun & Bradstreet Inc.

If appliance and auto makers have a big spring push, brass mill worries will subside.

Lead Sales Hold

Look for lead shipments to domestic users to be about equal to January totals. Explains one primary producer: "Our estimates for February are going to come within about 5 per cent of actual sales. We estimated February sales would be about 6 per cent better than January's."

Zinc Sales Better

Zinc sales are moderate to good. Most producers indicate that sales will be slightly ahead of January.

During January, primary domestic zinc shipments reached 67,273 tons, reports the American Zinc Institute. The effect of government purchasing: 15,377 tons were shipped to U.S. stockpile.

Aluminum Notes

1. Look for Gov. Averell Harriman (New York) to approve Reynolds Metals Co.'s petition for St. Lawrence electrical power to supply the $88 million (100,000 ton annual capacity) aluminum smelter near Massena, N. Y.

Over 9 hours of hearings were held on Feb. 6. Final decision must be made by tomorrow evening (Feb. 19). During the hearings, Reynolds had the support of the United Steelworkers Union and other building trade and electrical unions. "Never," reports a Reynolds spokesman, "have we had such support from labor and local municipalities."

2. One out of every three pleasure boats is being built of aluminum, says the Aluminum Co. of America. It adds: Some 75 per cent of all pleasure craft carry aluminum hardware. Result: Pleasure boat builders will consume more than 8000 tons of aluminum this year. Another 11,000 tons will go into outboard motors.

NONFERROUS PRICE RECORD

	Price Feb. 6	Last Change	Previous Price	Jan. Avg.	Dec. Avg.	Feb., 1956 Avg.
Aluminum ..	27.10	Aug. 10, 1956	25.90	27.100	27.100	24.400
Copper	33.00–34.00	Feb. 5, 1957	34.00	35.433	35.650	48.076
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.800	15.800
Magnesium .	35.25	Aug. 13, 1956	33.75	35.250	35.250	32.500
Nickel	74.00	Dec. 6, 1956	64.50	74.000	70.880	64.500
Tin	102.50	Feb. 11, 1957	103.00	101.480	104.465	100.908
Zinc	13.50	Jan. 6, 1956	13.50	13.500	13.500	13.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

BRIDGEPORT BRASS
COPPER ALLOY BULLETIN

Bridgeport Brass Co. Reporting New Developments in Copper-Brass Alloys and Metalworking Methods

Two Easily Machined Bridgeport Alloys That Offer Outstanding Advantages

by M. A. BUELL
Chief Staff Metallurgist

When everyday requirements call for dependable, fast-cutting rod, consideration should be given to two outstanding free-cutting alloys:

Bridgeport Alloy No. 6, the standard free-cutting brass rod, has exceptionally free-machining qualities. Containing 61% copper, 3.4% lead and 35.6% zinc, it has a uniform composition and can be finished to extremely close tolerances.

Bridgeport Tellurium Copper Alloy No. 112 offers unusually good machinability – 90 as compared to 100 for free-cutting brass Alloy No. 6 – but it also has extremely high electrical and thermal conductivity ratings as well as unusually high resistance to corrosion.

Tellurium Copper No. 112 is ideal for all types of electrical parts, welding torch and soldering iron tips, as well as any other heat- and electrical-conducting parts requiring considerable machining.

Comparative ratings of each alloy are given below.

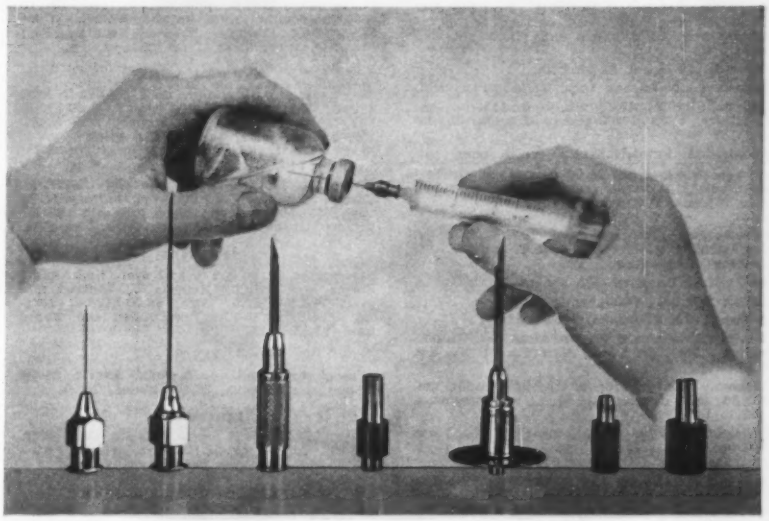
	Free-Machining Brass No. 6	Tellurium Copper No. 112
Thermal Conductivity*	67	204
Electrical Conductivity**	26	90
Machinability Rating	100	90
Cold-Working	Poor	Good
Hot-Working	Fair	Good
Hot-Working Range °F	1300-1450	1400-1600

*Btu/sq ft/ft/hr/°F @ 68° F
**% IACS @ 68° F Soft

Quick Way To Solve Your Metals Problems

Brass, copper and bronze alloys are all available in a widely varying range and combination of characteristics. Some are free-cutting, some have unusual ductility, others intrinsic hardness and still others high tensile strength. For best results, however, the metal should be matched to the job, both from the standpoint of machining as well as eventual product use. An easy way to get the answer to these questions is to talk over your metals selection problems with your Bridgeport salesman. Backed by Bridgeport's Technical Service, he can give you the finest possible help in solving your metals problem.

Free-Cutting Bridgeport Brass Plays Vital Role In Manufacture Of High-Precision Hypodermic Needles



Roehr Products Company, Inc., Waterbury, Connecticut, and Deland, Florida, manufactures over 1000 different types of hypodermic needles for every kind of medical and veterinary use. Each needle is designed and manufactured to high precision standards and to meet exacting tolerances on inside and outside diameters, finish and concentricity.

Hub Requirements

The hubs – an extremely important part of the needle from the point of view of exact fit – are made of Bridgeport Free-Machining Brass Rod, Alloy No. 6. Hub needle holes range from .018" to .085". Hubs are secured to the needles in a single press operation. In securing the needles to the hub it is imperative to avoid exerting excessive pressure – otherwise the needle walls would be pressed together and the needle would be constricted and useless. At the same time, the closure of the hub around the needle must be perfectly air- and liquid-tight. Each finished needle is tested under 45 pounds of pressure between the needle and the syringe.

Free-Machining Brass Is Versatile

The adaptability of Alloy No. 6 to the precise requirements of hypodermic needle manufacture is but another of the increasing number of jobs that this all-around alloy does so well. Its outstanding corrosion resistance is especially important in medical and pharmaceutical use. Its affinity for plating is another quality that governs its use in these instruments.

Wide Number of Uses

Many millions of needles are manufactured annually by Roehr—each must be flawless. Vaccine programs, blood banks, hospitals, doctors, veterinarians, research organizations, pharmaceutical houses – all must be sure that the needles they use are perfect in every respect.

Worth Investigating

Perhaps your present or future manufacturing or fabricating needs are not so exacting as Roehr's – perhaps they are more so. In either case, it will pay you to look into the impressive possibilities of Bridgeport Free-Machining Brass. Your Bridgeport salesman, with Bridgeport Technical Service behind him, will be glad to help. Call him.

BRIDGEPORT BRASS
Bridgeport Brass Company, Bridgeport 2, Connecticut, Offices in Principal Cities
In Canada: Noranda Copper and Brass Limited, Montreal

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 214, 30.50; No. 356, 28.90. 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.35 per lb for 550-lb keg; $2.37 per lb for 100-lb case; $2.42 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 34.00 deld. Conn. valley; 34.00 deld. Midwest; custom smelters, 33.00 deld.; lake, 34.00 deld.; fire refined, 33.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U.S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 98+%, cups or ingots, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.25; ingot, 36.00, f.o.b. Velasco, Tex. 13 in. sticks, 59.00, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (diecasting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-$257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot or ingots for addition to cast iron, 74.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01.

Osmium: $80-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $96-$101 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $12.00-$15.00 per lb.

Silver: Open market, 91.375 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.65 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N.Y., spot, 102.50; prompt, 100.375.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $2.75; grade A-2 (0.5% Fe max), $2.50 per pound.

Tungsten: Powder, 98.8%, carbon reduced. 1000-lb lots, $4.20 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $5. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. New York basis, add 0.50. High grade, 14.85; special high grade, 15.25 deld. Die casting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50 deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $10 per lb; reactor grade, $14-$22 per lb, depending on quantity. Powder electronics grades, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.25-28.75; No. 12 foundry alloy (No. 2 grade), 23.00-23.25; 5% silicon alloy, 0.60 Cu max, 24.25-25.50; 13 alloy, 0.60 Cu max, 24.25-25.50; 195 alloy, 24.00-26.25; 108 alloy, 22.00-23.00. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.75.

Brass Ingot: Red brass, No. 115, 32.50; tin bronze, No. 225, 42.00; No. 245, 37.00; high-leaded tin bronze, No. 305, 36.25; No. 1 yellow, No. 405, 25.75; manganese bronze, No. 421, 29.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb: nominal 1.9% Be alloy.) Strip, $1.86-$1.91, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.88, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 39.355; l.c.l., 39.98. Weatherproof, 30,000-lb lots, 39.28; l.c.l., 40.03. Magnet wire deld., 15,000 lb or more, 46.68; l.c.l., 47.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $11.00-$14.75; sheared mill plate, $9.25-$11.25; wire, $8.50-$11.00; forging billets, $6.85-$7.10; hot-rolled and forged bars, $7.10-$7.35.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $20.35; H.R. strip, $23.95; C.R. strip, $32.00; forged or H.R. bars, $18.40; wire, 0.015 in., 8.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range, Inches	Flat Sheet	Coiled Sheet
0.249-0.138	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.80
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.96	38.80-41.50
0.047-0.038	43.90-55.60	38.60-42.90
0.037-0.030	44.30-50.00	40.40-44.70
0.029-0.024	44.90-52.40	41.00
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.60-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.03
0.007	56.50	51.80
0.006	58.10	53.20

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.5
5050-F	41.3	45.6
3004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	55.4	62.5

*24-48 in. widths or diam., 72-180 lengths.

Screw Machine Stock: 30,000 lb base.

Diam., (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-finished				
0.375-0.547	58.80	57.50	70.10	65.50
0.563-0.688	58.80	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
1.125-1.500	55.20	53.90	59.00	56.10
Rolled				
1.563	53.70	52.40	....	....
1.625-2.000	53.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$18.45	2	$ 57.00
1	29.00	4	157.20
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.90-47.50	61.50-65.80
12-14	46.20-47.70	62.20-66.80
15-17	46.40-48.30	63.50-68.50
18-20	47.00-48.80	65.50-71.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.0 in., 93.30. Thread plate, .188 in., 71.70; .250-2.0 in., 70.60; Tooling plate, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 13.00-13.50; old sheets, 8.00-8.50; borings and turnings, 6.00-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	53.36c	....	56.32	30.000	30.000	29.250
Yellow Brass	48.85	38.93d	49.39	51.76	23.250	23.000	21.375
Low Brass, 80%	51.80	51.74	52.34	54.61	25.750	25.500	25.000
Red Brass, 85%	52.84	52.78	53.38	55.65	26.750	26.500	26.000
Com. Bronze, 90%	54.43	54.37	54.97	56.99	27.750	27.750	27.000
Manganese Bronze	56.66	50.76	61.00	....	21.750	21.500	21.000
Muntz Metal	50.99	46.80	....	....	22.000	21.750	21.250
Naval Brass	52.92	47.23	59.98	56.33	21.750	21.500	21.000
Silicon Bronze	60.52	59.71	60.56	62.64	29.375	29.125	28.375
Nickel Silver, 10%	65.36	65.36	67.69	....	29.500	29.250	14.750
Phos. Bronze, A 5%	75.22	75.72	75.72	76.90	31.000	30.750	29.750

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

6.50; crankcase, 8.00-8.50; industrial castings, 8.00-8.50.

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 22.00-22.50; light copper, 19.50-20.00; No. 1 composition red brass, 21.50-22.00; No. 1 composition turnings, 20.00-20.50; yellow brass turnings, 12.25-12.75; new brass clippings, 19.50-20.00; light brass, 12.50-13.00; heavy yellow brass, 14.50-15.00; new brass rod ends, 17.00-17.50; auto radiators, unsweated, 15.50-16.00; cocks and faucets, 16.50-17.00; brass pipe, 17.25-17.50.

Lead: Heavy, 12.00-13.00; battery plates, 6.25-7.00; linotype and stereotype, 13.00-14.00; electrotype, 12.50-13.00; mixed babbitt, 13.00-13.50.

Monel: Clippings, 80.00-85.00; old sheets, 75.00-80.00; turnings, 65.00-75.00; rods, 80.00-90.00.

Nickel: Sheets and clips, 150.00-185.00; rolled anodes, 150.00-185.00; turnings, 135.00-160.00; rod ends, 150.00-185.00.

Zinc: Old zinc, 4.50-5.00; new die-cast scrap, 3.75-4.00; old die-cast scrap, 2.25-2.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 17.00-17.50; 3003 clippings, 17.00-17.50; 6151 clippings, 17.00-17.50; 5052 clippings, 16.50-17.50; 2014 clippings, 16.50; 2017 clippings, 16.50; 2024 clippings, 16.50; mixed clippings, 16.00-16.50; old sheets, 14.00-14.50; old cast, 14.00-14.50; clean old cable (free of steel), 16.00-17.50; borings and turnings, 14.00-15.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 25.00; light copper, 22.75; refinery brass (60% copper) per dry copper content, 23.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 25.00; light copper, 22.75; No. 1 composition borings, 23.00; No. 1 composition solids, 23.50; heavy yellow brass solids, 15.00; yellow brass turnings, 14.00; radiators, 17.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 52.79; oval, 51.92, 5000-10,000 lb; electrodeposited, 43.75; 20000-5000 lb lots; cast, 46.00, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab; less than 200 lb, 121.50; 200-499 lb, 120.00; 500-999 lb, 119.50; 1000 lb or more, 119.00.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb, in 100-lb drums.

Chromic Acid: 100 lb, 33.20; 500 lb, 32.70; 2000 lb, 32.05; 5000 lb, 31.75; 10,000 lb, 31.25, f.o.b. Detroit.

Copper Cyanide: 100-1000 lb, 77.50.

Copper Sulphate: 100 lb, 26.65; 200 lb, 23.65; 300 lb, 22.65; 400 lb, 22.15; 500 lb, 20.65; 2000 lb, 18.40; 6000 lb, 18.15; 12,000 lb, 17.90, f.o.b. shipping point.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400 lb, 43.50; 5000 lb, 41.50; 10,000 lb, 40.50.

Nickel Sulphate: 100 lb, 40.50; 200 lb, 38.50; 300 lb, 37.50; 400 lb, 35.50; 5000 lb, 33.50; 20,000 lb, 33.00; 36,000 lb, 32.50.

Sodium Cyanide: 100 lb, 27.50; 200 lb, 25.80; 400 lb, 22.80; 1000 lb, 21.80, f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 80.10; 100-600 lb, 70.70; 700-1900 lb, 68.00; 2000-9900 lb, 66.10; 10,000 lb or more, 64.80.

Stannous Chloride (anhydrous): Less than 25 lb, 170.20; 25 lb, 135.20; 100 lb, 120.20; 400 lb, 117.70; 5200-19,600 lb, 105.50; 20,000 lb or more, 93.30.

Stannous Sulphate: Less than 50 lb, 132.70; 50 lb, 102.70; 100-1900 lb, 100.70; 2000 lb or more, 98.70.

Zinc Cyanide: Under 1000 lb, 55.55; 1000 lb and over, 53.55.

(*Concluded from page* 249)

slightly to a range of $14.75 to $15.75. Sales are also strong in foundry beehive coke, but the price of that grade remains steady. Most sales average around $18 a ton.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2600 tons, paper plant, Kimberly-Clark Corp., New Milford, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; W. J. Megin Inc., Naugatuck, Conn., general contractor.

1985 tons, five-span welded girder bridge superstructure, Farmington river, and four composite rolled beam bridges, Windsor-Windsor Locks, Conn., to the City Iron Works, Hartford, Conn.

828 tons, Eagle Gorge project, third phase, bridge, etc., to Fabricated Steel Division, United Concrete Pipe Corp., Auburn, Wash.; Paul Jarvis Inc., Seattle, general contractor, low at $985,716 to U.S. Engineer, Seattle.

790 tons, state bridge work, route 208, section 1D, Bergen county, New Jersey, through Franklin Contracting Co., general contractor, to Todd Shipyards, Jersey City, N.J.

650 tons, two state highway bridges, Fall River expressway, Canton-Stoughton, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; DeMatteo Construction Co., Quincy, Mass., general contractor.

638 tons, hangar, etc., Adak Naval Base, Alaska, to Isaacson Iron Works, Seattle; Raper & Kief, Seattle, general contractor.

450 tons, three state bridges, Westwood-Norwood, Mass., to West End Iron Works, Cambridge, Mass.; Charles Capone Co., Dedham, Mass., general contractor.

222 tons, Washington state railroad undercrossing, to United Concrete Pipe Corp., Auburn, Wash.; Paul Jarvis Inc., Seattle, general contractor.

210 tons, New York state bridge, Ulster county, through John Arborio Inc., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, transmission towers, Connecticut Power & Light Co., Enfield, Conn., to Bethlehem Steel Co., Bethlehem, Pa.

195 tons, two state bridges, Orleans-Brewster, Mass., Mid-Cape highway, to Tower Iron Works, Providence; S. & M. Construction Co., Providence, R. I., general contractor.

184 tons, Washington state, Weyerhaeuser bridge, to United Concrete Pipe Corp., Auburn, Wash.; Alexander & Co., Seattle, general contractor.

160 tons, building, *Herald-News*, Passaic, N.J., to the Bergen Point Iron Works, Bayonne, N.J.

100 tons, including bar joists, warehouse-office, General Tire & Rubber Co., Industrial Center, Needham, Mass., to Groisser & Schlager Iron Works, Somerville, Mass., and Copley Steel Products Co., Boston; Aberthaw Construction Co., Boston, general contractor.

100 tons, Washington state undercrossing, to United Concrete Pipe Corp., Auburn, Wash.; Cherf Bros. & Sandkey, Ephrata, Wash., general contractor.

78 tons, transmission towers, Seattle city light department, to Bethlehem Pacific Coast Steel Corp., Seattle, low at $36,313.

STRUCTURAL STEEL PENDING

1225 tons, nine grade separation structures, Connecticut turnpike 324-01, Old Lyme, East Lyme and Waterford; bids Feb. 18, Hartford; also 715 tons, reinforcing bars, 665 tons, mat reinforcement, and 600 tons, steel piles.

1090 tons, steel frame Rocky Reach power house, Columbia river; bids to Kirby Billingsley, manager, PUD No. 1, Wenatchee, Wash., March 8; plans by Stone & Webster Engineering Corp., Seattle.

725 tons, five state bridges, Allentown, Pa.; S. J. Groves, Woodbridge, N.J., is low on the general contract.

400 tons, north service center, Seattle light department; Sellem & Hansen, Seattle, apparently low at $1,111,600.

300 tons, fabricated and delivered, DOW AFB, Maine; Corps of Engineers, Boston.

250 tons, Helena Valley pumping plant, rebids; Dec. 4 bids rejected; bids to the Bureau of Reclamation, Canyon Ferry, Mont., Feb. 26.

REINFORCING BARS . . .

REINFORCING BARS PLACED

750 tons, St. Thomas Catholic School, to Northwest Steel Rolling Mills Inc., Seattle; Henrik Vallee Co. Inc., Seattle, general contractor.

600 tons, runway extension, Boeing airfield, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle.

530 tons, paper plant, Kimberly-Clark Corp., New Milford, Conn., to U.S. Steel Supply Division, U.S. Steel Corp., Pittsburgh; W. J. Megin Inc., Naugatuck, Conn., general contractor.

440 tons, Washington state underpass, King county, to Bethlehem Pacific Coast Steel Corp., Seattle.

350 tons, Boeing Airplane Co., spar mill, to Joseph T. Ryerson & Son Inc., Seattle; Sound Construction & Engineering Co., Seattle, general contractor.

250 tons, 7-story addition, Cabrini Hospital, Seattle, to the Soule Steel Co., Seattle; James I. Barnes Construction Co., Seattle, general contractor, low at $2,461,868.

165 tons, hangar, etc., Adak, Alaska, naval base, to Bethlehem Pacific Coast Steel Corp., Seattle; Raber & Kief, Seattle, general contractor.

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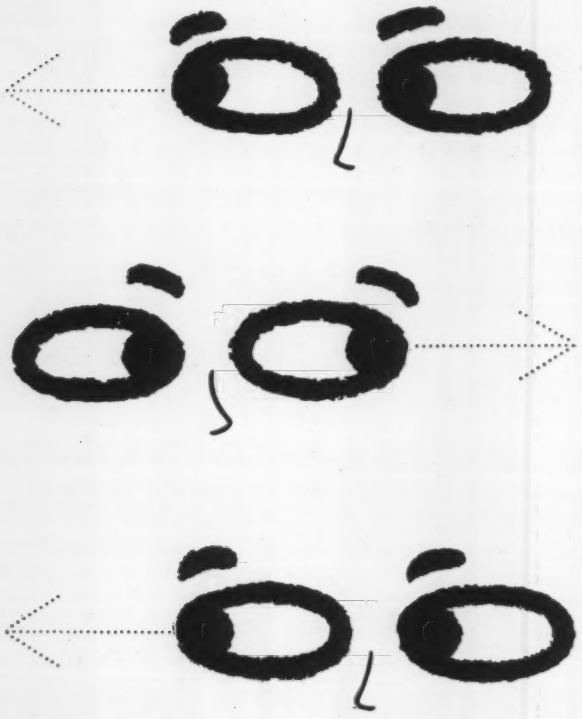
CLASSIFIED

Help Wanted

WIRE MILL IN MIDDLE WEST WANTS Electrical Engineer. Prefer mechanical engineering background, but not essential. Give full particulars. Reply Box 515, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED: FOREMAN FOR DRAWING DEPARTMENT. High and Low Carbon Wire Mill. Give full particulars. Reply Box 516, STEEL, Penton Bldg., Cleveland 13, Ohio.

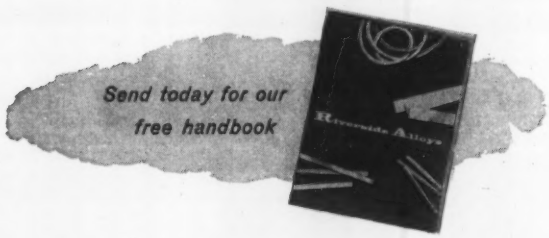


Alternating stresses bear watching!

Back and forth . . . up and down . . . in and out . . . if those stresses keep changing, the life of a metal part is a hard one . . . and often a short one. Stress reversals can cause "fatigue" failure at stresses far below the expected strength of the metal.

One of the outstanding properties of phosphor bronze is its high resistance to fatigue failure. It is widely used for electrical switch parts, relay contact springs, bellows, rotating shafts and other moving or vibrating parts.

For detailed information on phosphor bronze, write to Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.



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Riverside, N.J.

PRENTISS WIRE MILLS
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Hyde Park

RED CIRCLE Rolls ALLOY-CHILLED

Gray Iron Castings

Hyde Park Castings up to 80,000 pounds are sound, accurate and physically dependable.
Precision machining is done by skilled craftsmen in our modern machine shop.
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Hyde Park
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ROLLS
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GREY IRON CASTINGS

Tool Steel Topics

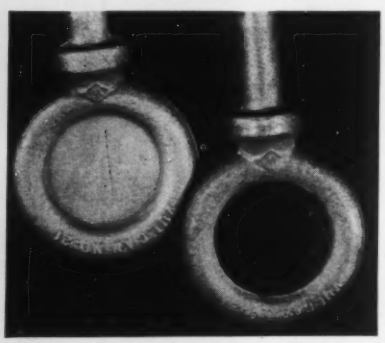
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

Bearcat Puts the Eye in Eye Bolt . . . And Does It Economically

Putting the eye in an eye bolt is one thing, but doing it quickly, accurately and economically on thousands of pieces is something else again. J. H. Williams & Co., Buffalo, who make wrenches, tools and drop-forgings, changed to Bearcat for the punching operation shown here. They found that because of Bearcat's fine wear-resistance and shock-resistance, the punch provided a service life about 50 pct longer than the one previously used.



The Bearcat punch, hardened to Rockwell C 56-58, works on steel stock 1/8 in. and 5/16 in. thick, and knocks out dises approximately 3/4 in. in diameter. About 0.020 in. to 0.040 in. is removed in occasional redressing.

Bearcat is our super-tough, air-hardening, general-purpose grade of tool steel. It is perhaps best known for its exceptional resistance to shock and wear. Besides, its air-hardening characteristic minimizes quenching hazards, and also provides excellent resistance to distortion in heat-treatment.

Bearcat has a wide range of tough applications, too. In addition to its use in punches, it's a natural for rivet sets, chisels, gripper dies and hot-headers. It is also ideal for master hobs, and for dies used in blanking, bending, and cold-forming.

Your local tool steel distributor has a stock of Bearcat, and chances are good that he can furnish exactly what you need. Call him now, while you have it in mind.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Choosing the Grade Means More Than Naming the Tool

Let's say you have a general tool-and-die application, for which you are to select the proper grade of tool steel. How do you go about it? Obviously, it is not enough to know that the customer wants high hardness and good wear-resistance, for these properties are always required, in some degree. What you need are the answers to the following questions:

1. How is the tool to be made?
2. How is it to be used? Blanking? Forming? Cutting?
3. How is the steel to be heat-treated?
4. Are machinability and wear-resistance important?
5. How close must size be held after heat-treatment?
6. What is the previous experience with this job? Which steels were used and what results were obtained?

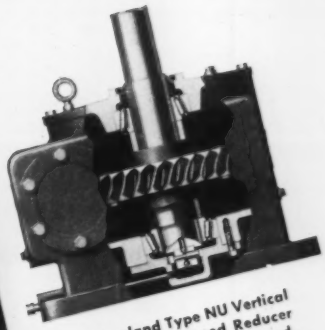
Selecting tool steel grades, even when you want perfection of operation, isn't too hard when sufficient data is available. But without adequate information, you may find your selection is disappointing.

TOOL STEEL MOVIE WINS ANOTHER AWARD

Bethlehem's tool steel color movie, "Teamwork," an award winner at film festivals at Columbus and Chicago, recently won a Certificate of Merit at the Cleveland Film Festival.

The 16-mm, 30-minute picture explains the quality control and heat-treatment of Bethlehem tool steel, and shows typical applications of the carbon, oil- and air-hardening, shock-resisting, hot-work, and high-speed grades.

It's excellent for showing to heat-treaters, die-makers, machinists and machine-tool manufacturers, as well as to technical societies and engineering students. If you would like to schedule a showing of "Teamwork," send your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.



Cleveland Type NU Vertical Worm Gear Speed Reducer with drive shaft upward. Cutaway shows heavy gear shaft, rugged shaft bearing mounting and extra sturdy housing construction.

Versatile, fast acting filter has NU drive

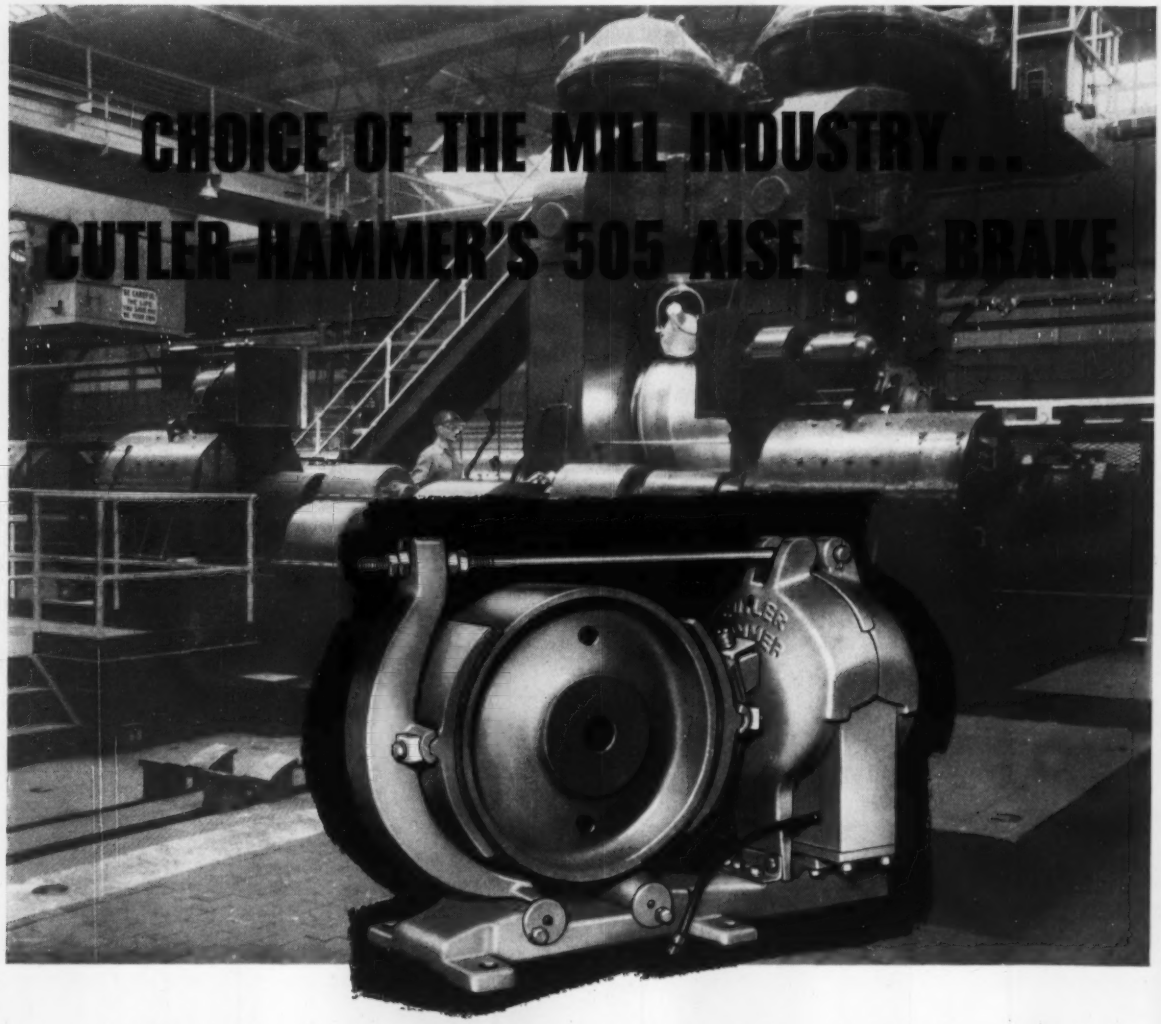
CLEVELAND Type NU Worm Gear Drive transmits smooth, uniform speed to permit efficient operation for this Filtration Engineers' Horizontal Rotary Vacuum Filter. For coarse crystalline materials, fibrous pulps and other free-settling substances, it offers high capacity, fast dewatering and excellent cake washing.

It was important that this filter be compact. Right angle construction of the Cleveland Worm Gear saves space. Efficient performance is inherent. There's smooth, uninterrupted torque flow and quiet running. Case hardened steel worm and nickel-bronze gear actually improve with use—will be even more efficient years from now.

Get the complete Cleveland story before you install your next speed reducer; see how much Clevelands can do for you. Write for Catalog 400. The Cleveland Worm and Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Drives



★ **Simplified Design** ★ **Rugged Construction** ★ **Dependable Performance**
★ **Ease of Installation and Maintenance**

Compare the Cutler-Hammer 505 D-c Brake with any other, and instantly you will appreciate why the 505 is the choice of the mill industry. The service proven over-the-wheel pull rod is the simplest means of transmitting maximum braking force. Notice only one operating coil, only one torque spring, and only one torque adjustment. Gone is the clutter and multiplicity of pins, linkages and cantilevers common to other brakes.

Check the shoe-lever and base plate joints. Here troublesome pivot pins have been eliminated, and replaced by oversize bearing sockets which cut bearing pressure to a fraction of that found in other mill brakes. The tough, weather-proof capsule coil will out-perform all others. The brake shoes have heavy duty riveted linings. The wheel is specifically designed for braking service using only the finest high strength ductile iron.

Superior performance of the Cutler-Hammer 505 D-c Brake is a natural result from its simplified design and rugged construction. The 505 is direct-acting, and exclusive one-to-one leverage provides maximum braking effectiveness. This brake was designed and built to out-perform, out-last all others.

Ease of installation and maintenance is a major consideration in any device destined for mill application. Because of the simplified design and minimum number of parts, the 505 can be completely assembled in a matter of minutes with ordinary hand tools. Capsule coil can be quickly changed or reversed while on the job. Only two adjustments required to put the brake into operation. Brake linings can be serviced quickly without disassembly of the brake. No special tools required for any maintenance operation.

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For complete information write for the descriptive literature detailing construction, torque ratings, types, sizes and service characteristics. CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. Associate: Canadian Cutler-Hammer, Ltd., Toronto, Ontario.